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DESIGN, PRODUCT IDENTITY AND TECHNOLOGICAL INNOVATION

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**6.1 DESIGNER AND USER RESPONSES TO THE NON-SUPPORT
SECTION OF THE QUESTIONNAIRE**

Each response is prefaced by the appropriate Manufacturing (M), Operational (O), Stylistic (S) or Technological (T) classification.

Note: D indicates a Design response, U a User response.
The M, O, S, T classification precedes the response number.

Question 1 What is the red light for?

Response:

0	D1	It shows that the power is on.
Nil	D2	This was a market requirement, I do not know the full reason.
0	D3	It was thought that the consumer required it as a "comfort" in addition to the cavity light indicating that the oven is on.

CONSENSUS 0

Question 1 What is the red light for?

Response:

0	U1	to show that the oven is on
0	U2	so that I can tell that it is on - apart from the noise
0	U3	shows that the power is on and is linked with the inside light
0	U4	to show that the oven is on
0	U5	to tell if the oven is on or off
Nil	U6	do not know
0	U7	to show that the power is on
0	U8	so that I can tell that the oven is on
0	U9	to show that the oven is on
0	U10	it shows that the power is on

Question 2 Why is it red rather than any other colour?

Response:

- T D1 Because neons (which this is) are normally red or orange, although it is possible to obtain other colours, but not usual.
- OT D2 It is a good visible colour - it provides high lumens for low power from the back.
- S D3 In theory any colour was possible, although the colour red is traditionally chosen for ovens - not so in the case of refrigerators and freezers where they are often yellow, blue or green - it was therefore chosen to relate to the identity of other forms of cooking.

CONSENSUS TOS

Question 2 Why is it red rather than any other colour?

Response:

- O U1 red is associated with go
- SO U2 it is eye-catching, red is associated with warning - it is pretty
- S U3 it looks better in red
- O U4 traditional colour for warning lights, eg washing machines
- SO U5 because red is a warning colour and the colour relates to the colours around the timer and power switches
- O U6 to indicate danger
- O U7 it stands for danger
- O U8 indicates danger
- O U9 because red is associated with danger
- O U10 because this colour is associated with danger

Question 3 Why is it rectangular and not round, for example?

Response:

- S D1 Largely to do with visual styling, it matches the majority of other shapes on the product with the exception of the two power and time controls.
- S D2 So that it matches the rectangular door frame.
- S D3 It tends to have a very definite visual image which emphasises the horizontal and also the quality of being an "eye" - very keen on making the cooker look horizontally lengthy rather than tall.

CONSENSUS S

Question 3 Why is it rectangular and not round, for example?

Response:

- O U1 so that it will not be confused with the power and timer scales
- S U2 so that it will blend in with the rest of the design - apart from the switches
- T U3 for technical reasons
- S U4 looks neater and simpler than a round one
- O U5 for optical reasons, so that it can be seen clearly
- S U6 to improve the looks of the oven
- O U7 it attracts the attention more easily
- O U8 so that it can be easily differentiated from the other two controls
- O U9 so that it can be noticed more easily as contrasted with the circular scales
- O U10 because it is a warning light, it must stand out, so it is rectangular and not round as the switches are

Question 4 Why is the power control knob smaller than
the time knob?

Response:

- M D1 I do not know exactly, but I do know that the spindle sizes are different so it could well be related to getting the right knob on the right spindle during assembly.
- Nil D2 A USA constraint.
- 0 D3 I do not really know. However, it is probably related to the fact that more turning torque is required on the timer rather than the power switch. It is a quality that was present on the original Litton oven.

CONSENSUS MO

Question 4 Why is the power control knob smaller than
the time knob?

Response:

- 0 U1 so that blind people will be able to differentiate them
- 0 U2 for blind people to use
- T U3 technical reasons
- Nil U4 unable to answer
- 0 U5 so that it is easier to clean
- 0 U6 so that on the power switch there is more room to see the scale; also the top switch is more difficult to turn, so needs to be larger
- 0 U7 the timer is bigger because it is more important
- 0 U8 as an aid to the blind
- 0 U9 to distinguish between the two controls - hadn't noticed it before you showed me
- 0 U10 if you are short-sighted it is easier to distinguish between the two

Question 5 Why does it have a metallic finish?

Response:

- M D1 It is a standard knob which is readily available -
it would have been a lot more difficult to get
exactly what we wanted.
- Nil D2 A USA constraint - typically flashy.
- MO D3 The knobs were off the shelf, normally used in
products in the USA. The metallic finish
emphasises the fact that the knobs are functional
and relate this function to the oven door switch.
(Later Litton models have a darker oven switch.)

CONSENSUS MO

Question 5 Why does it have a metallic finish?

Response:

- S U1 to improve the way the product looks
- S U2 to match the metallic surround of the door and
control panel
- S U3 to improve the way the product looks
- S U4 to improve the looks
- O U5 so that it is easier to clean
- M U6 it is cheaper to manufacture
- S U7 because it looks smarter - like the metallic
finish on cars
- S U8 just for the looks
- T U9 a metal finish is longer-lasting than a plastic
one
- T U10 it will last longer

Question 6 Why does the power scale only extend around
part of the circle?

Response:

- T D1 It registers 0 to 100% power and cannot go directly from low to high power because there is no step-down system, as there is on some cookers where the power switch can be rotated all the way round.
- T D2 I do not know the full reason, it is something to do with the control unit.
- T D3 Because of the mechanical design of the power control device.

CONSENSUS T

Question 6 Why does the power scale only extend around
part of the circle?

Response:

- O U1 prevents you from going from low power to high power accidentally
- T U2 so that there is a slow build-up to maximum power - not too sure about this because one can switch it on at maximum power - technical reasons
- O U3 it can be operated easier
- T U4 not easier to use - would have been easier for left-handers if it did go right round; it is the same as my washer - to do with the mechanism
- O U5 as a safety factor, so that one sees a definite gap
- T U6 to stop it being operated directly from off to high for technical reasons
- T U7 for technical reasons, it stops you from getting right round to the start
- T U8 for technical reasons - to do with the things inside
- T U9 every scale has to have a beginning and an end - for technical reasons (Mr T, does it have a programme to switch itself off?)
- T U10 I do not know, but it is like the timer on my cooker - it is a set thing (technological)

Question 7 Why does it have a part-yellow, part-orange circle around it?

Response:

- 0 D1 To give an indication of the energy input.
- 0 D2 To draw the attention of the public to the cold zone and the hot zone.
- 0 D3 It indicates the different areas where different levels of cooking occur, shows the power being used, where to reheat, etc. 30% power used for reheating and defrosting.

CONSENSUS 0

Question 7 Why does it have a part-yellow, part-orange circle around it?

Response:

- 0 U1 the colours are associated with high and low powers and temperatures
- 0 U2 because the orange stands for cook and the yellow for defrost
- 0 U3 it indicates the power - red associated with heat
- 0 U4 to show which is cooler and which is hotter cooking
- 0 U5 it indicates the heating effect
- 0 U6 indicates lowest and highest heat settings
- 0 U7 these indicate high and low power
- 0 U8 to show that the control is to do with radio waves
- 0 U9 to show that there are two different heat settings - a higher and a lower
- 0 U10 to indicate the different levels of cooking power

Question 8 Why is the time switch above and not below
the power switch?

Response:

Nil D1 I do not know - a USA constraint.
Nil D2 I do not know the reason - I do not think it is
critical.
O D3 Because the time switch is always used when
cooking, unlike the power switch. Also the use
of the oven runs sequentially from the top of
the control panel to the bottom: time, power,
door switch, and the position appropriate to
this sequence.

CONSENSUS 0

Question 8 Why is the time switch above and not below
the power switch?

Response:

O U1 easy to operate that way round
TM U2 for technical reasons - it is easier for the
manufacturer to produce like this
O U3 it is easier to operate this way round
M U4 easier to manufacture this way
O U5 because you have to work out how long first,
and then the power setting
T U6 for technical reasons
O U7 because the timer is more frequently used than
the power control
O U8 to help to operate the oven - yet this conflicts
with the instructions, which say to operate the
power control first
M U9 probably because it is easier to manufacture
this way
T U10 it has to do with the works - technological

Question 9 Why does the minute scale get larger, the
nearer it gets to zero?

Response:

- 0 D1 So that it will be more accurate at the lower
time settings.
- Nil D2 I do not know the reason, this originated in
the USA.
- T0 D3 There are two reasons: firstly the mechanism
is logarithmic, secondly the bulk of the cooking
takes place at short time intervals and the
scale gives better definition and accuracy for
the user at this point. Accuracy is less
significant at greater time levels.

CONSENSUS OT

Question 9 Why does the minute scale get larger, the
nearer it gets to zero?

Response:

- 0 U1 because smaller times are used most frequently,
I have never been above 15 minutes
- 0 U2 because 30 seconds does not matter much over a
30 minute period but is critical over short
periods - and the shorter times are used more
frequently anyway
- T U3 for technical reasons
- 0 U4 easier to operate for those foods which take
only a few seconds
- 0 U5 because more use is made of the smaller times
- T0 U6 for technical reasons, and more use is made of
the smaller time sequences
- 0 U7 because the shorter times are used more often
- 0 U8 I have not cooked anything for 30 minutes - it
makes operation easier
- 0 U9 to get a finer degree of setting for smaller
times
- T U10 I never noticed because I never use the longer
times, I double the shorter times for longer
periods because you must keep turning the food
(technological)

Question 10 Why does it have an orange circle around it?

Response:

- S D1 To fit in with the general style of the product.
- S D2 Probably to balance it with the power scale - purely decorative, there is no visual coding to do with the power scale.
- S D3 This was a Creda styling decision - probably to accentuate the control.

CONSENSUS S

Question 10 Why does it have an orange circle around it?

Response:

- O U1 so that you will be able to see that it is on
- S U2 to match the power scale
- S U3 to improve the looks
- S U4 to match the power switch
- O U5 as a background to help you to see the scale more easily
- T U6 for technical reasons
- O U7 so that it is easier to see
- O U8 so that it is easier to read
- S U9 purely decorative
- T U10 for technical reasons

Question 11 Why was 30 minutes chosen as the limit of
the timer?

Response:

- M D1 The timing mechanism was what was available.
 We really wanted one which went up to 45 minutes
 because there are some foods which take this
 time to cook and ours would require resetting.
- Nil D2 I do not know.
- 0 D3 For this (domestic) operation, 30 minutes covers
 90% of all applications. With an increased time
 of 45 minutes, definition is lost at the shorter
 time levels.

CONSENSUS MO

Question 11 Why does it go up to 30 minutes and not a
greater or lesser time?

Response:

- 0 U1 this is the maximum that one needs to cook items
 for
- 0 U2 because you rarely go beyond 30 minutes - when
 it would become more worthwhile to use the con-
 ventional oven anyway
- 0 U3 because this time is suitable for most foods
- 0 U4 because 30 minutes is adequate
- 0 U5 this is the average necessary time
- 0 U6 30 minutes is a long time and adequate for most
 foods
- 0 U7 because this is adequate for most cooking
- 0 U8 because most things can be cooked within a limit
 of 30 minutes
- 0 U9 because most cooking is done at a lesser time
 than 30 minutes
- 0 U10 most things can be cooked within this period;
 you do not therefore need a longer time

Question 12 Why is the oven door release mounted on the control panel and not on the door itself?

Response:

- T D1 It is mechanically easier to arrange in relation to the door interlocks.
- O D2 It is logical, all the controls are in one area. (We did consider another approach, with the release mounted on top of the unit.)
- SM D3 The linkage from the door release to the controls is simpler to make if it is taken from the panel itself. Also it gives a "clean" door without any protrusions. This was an engineering staff decision and could well have been on the door.

CONSENSUS MOST

Question 12 Why is the oven door release mounted on the control panel and not on the door?

Response:

- OT U1 easier to use and wouldn't get damaged so easily when the door is open
- T U2 prevents the straining of the door hinges and damage to the door catches
- T U3 because if it was mounted on the door it would wear the hinges out in time
- SM U4 looks neater and probably easier to service
- T U5 for technical reasons and so that it relates to the controls mechanically more strongly
- M U6 so that all the controls are grouped together for cheaper manufacture
- O U7 it is handier - and would not get in the way as easily as it would if mounted on the door
- OT U8 if it was on the door it would get in the way - also would tend to cause seal damage if leaned on
- T U9 so that it does not weaken the door after constant operation
- O U10 it is easier to use and would be an obstruction if mounted on the door

Question 13 Why is the door release this particular shape?

Response:

Nil D1 I do not know - this is a USA constraint.
0 D2 I presume that it was the ergonomic way to do
it. (I would not have designed it this way
myself.)
S D3 I do not really know, but suspect that it
balances visually and again emphasises the
horizontal.

CONSENSUS OS

Question 13 Why is the door release this particular shape?

Response:

0 U1 because it is easy to use
0 U2 easier to use
0 U3 easier to operate
0 U4 easier to operate
0 U5 because it is convenient to press
OM U6 easy to operate and manufacture
0 U7 so that it is easy to press
0 U8 so that it can be easily differentiated from
the other two
0 U9 so that it can be operated positively
0 U10 no idea - easier to operate

Question 14 Why does it have a textured finish?

Response:

O D1 I do not know but suspect that it is easier to touch.

Nil D2 A USA constraint - again, typically flashy.

S D3 So that it does not show finger prints.

CONSENSUS OS

Question 14 Why does it have a textured finish?

Response:

O U1 so that wet hands will not slip on it

O U2 to prevent the hand from slipping

O U3 so that fingers do not slip on it

S U4 matches the strip around the door

O U5 for better pressure

O U6 so that the fingers do not slip

O U7 this makes it non-slip

O U8 so that you know that you are not touching other parts - and so that wet hands will not slip

O U9 so that it will be non-slip

S U10 no idea - it looks better

Question 15 Why does the door have a fine mesh across it?

Response:

- 0 D1 To screen out microwaves.
- 0 D2 To screen out microwaves.
- 0 D3 Prohibits microwave energy from exiting from the cavity. The holes in the mesh are smaller than the wavelength of the energy.

CONSENSUS 0

Question 15 Why does the door have a fine mesh across it?

Response:

- T0 U1 for technical reasons and prevents the door from shattering if broken
- 0 U2 did know but I have forgotten - I think it is to prevent the glass from shattering
- 0 U3 protection from the heat
- 0 U4 stops the glass from exploding - like toughened glass with wire in it
- 0 U5 to stop radiation coming through - the size of the holes is significant for this
- T U6 prevents heat distortion in the window glass
- 0 U7 it prevents the rays coming out
- 0 U8 it keeps the microwaves in
- 0 U9 to stop the rays from coming out
- T U10 no idea - provides protection for the glass

Question 16 Why does the door have a thick dark band
 around it?

Response:

S D1 Purely for stylistic reasons.
S D2 To disguise the frame of the interior cabinet
 (I think it makes the space look smaller).
S D3 It is a mask for the structural components of
 the oven cavity.

CONSENSUS S

Question 16 Why does the door have a thick dark band
 around it?

Response:

T U1 it protects the seal
S U2 for style - it concentrates the eye on the cooking
 space and not the wall thickness
O U3 not sure - for protection
S U4 for looks
O U5 to prevent microwave leakage around the side
T U6 reflects the rays - (I use it as a mirror, Mrs C)
T U7 this cuts down the flashing (electrical)
OT U8 for technical reasons - so that less microwaves
 will escape
O U9 to prevent the rays from coming out
T U10 no idea - for technical reasons

Question 17 Why is the control panel this particular colour?

Response:

S D1 For stylistic reasons.
MS D2 To match the above dark band on the door frame;
the other brown matches the brown used on the
current range of Creda products. It is a standard
colour.
Nil D3 I do not know, this was a Creda decision.

CONSENSUS MS

Question 17 Why is the control panel this colour?

Response:

S U1 to make it look more attractive
O U2 so that the controls are easier to read
S U3 this is a neutral colour to blend in with the
rest of the front
S U4 for appearance - to match the rest of the front
of the oven
S U5 for stylistic reasons - it gives a two-tone
effect
O U6 so that it can be seen better
O U7 so that it will stand out well
S U8 so that it will match the rest of the oven
SO U9 so that it matches the door - and the dials will
show up more clearly
SM U10 it is to match the standard colour of many
electrical goods and wiring

Question 18 What is the thin line around the panel for?

Response:

- S D1 To match the metal trim around the door.
- S D2 Balances the bright edge of the metal extrusion around the door. We tried designing the oven without it and it did not work.
- S D3 It visually encloses the controls - similar to the Litton original.

CONSENSUS S

Question 18 What is the thin line around the panel for?

Response:

- O U1 to make the controls stand out
- O U2 it makes the controls stand out
- S U3 it is decorative
- S U4 to match the door
- S0 U5 for style - it brings together all the controls in one block
- S U6 for decoration
- O U7 to attract your attention to the controls
- O U8 so that it isolates the controls
- S U9 for decoration
- S U10 to finish it off visually

Question 19 Why is the control panel at the side of the door and not above or below it?

Response:

- TM D1 Because it is not just a control panel but houses the transformer in the most convenient place, along with other components. If this was moved it would alter the shape of the product and would change the characteristics of wave distribution.
- T D2 For engineering reasons.
- TS D3 From a technological and mechanical standpoint, given the arrangement of the interior components, this is the simplest external form. Also, it again emphasises the horizontal aspect of the oven. It is more logical to connect it this way round.

CONSENSUS MTS

Question 19 Why is the control panel at the side of the door and not above or below it?

Response:

- O U1 easier to use - would be better on the top so that they would be away from children
- OM U2 it is easier to use this way and easier to manufacture
- O U3 it is easier to use - short people would not be able to use if mounted on top
- OS U4 easier to operate at the side and looks better
- O U5 it is the best position to enable you to operate the controls with the door open or closed
- M U6 easier to get at for servicing - for manufacturing reasons
- O U7 it is easier to control in this position
- T U8 for technical reasons - ie the magnetron has to be over the top, not the controls
- O U9 it is easier to see
- SO U10 it would look funny anywhere else - also better for right-hand users

Question 20 Why is there a gap between the door and the control panel?

Response:

MS D1 This is a manufacturing tolerance, it is less likely to show any taper that may exist.
S D2 It is not physically necessary - it exists for stylistic reasons.
T D3 The large tolerance decreases the risk of the door catching the frame.

CONSENSUS MST

Question 20 Why is there a gap between the door and the control panel?

Response:

T U1 stops the door from catching
T U2 so that the door can be opened without catching
OT U3 easier to clean and for technical reasons
T U4 for some technical reason
T U5 not for heat expansion; perhaps prevents deformation due to heat; most likely to prevent wear if the surfaces should come into contact
O U6 so that fingers do not get trapped in it
T U7 stops the door from catching
OT U8 for ease of opening the door and so that if anything gets jammed in, it does less damage
T U9 for technical reasons - and to stop the door from catching
T U10 no idea - for technical reasons

Product Enclosure

Question 22 Why was off-white chosen as the colour for the outer case?

Response:

- S D1 A styling consideration; we tried white but it was thought to be too harsh, this colour tones in better with the rest of the product.
- S D2 For marketing reasons - we all thought that it looked best; we had inherited wood grain from the USA but preferred this.
- Nil D3 It was a Creda decision.

CONSENSUS S

Question 22 Why was off-white chosen as the colour for the outer case?

Response:

- S U1 because it is a neutral colour which will blend in with most kitchens
- S U2 it is a clean colour without being clinical
- OS U3 white shows the dirt too easily - also this colour matches most kitchen colours
- S U4 for looks, a safe colour, will go with anything
- S U5 most modern kitchens are pale so that this colour will match
- S U6 for sales purposes - most popular colour (we would have preferred a choice)
- S U7 it goes better with the dark frontage than pure white
- S U8 for appearance - most other appliances tend to be this sort of colour
- S U9 so that it would go with most kitchens
- S U10 to blend in better visually

Question 23 Why does it have a textured finish?

Response:

- M D1 Because it had to be produced in plastic-coated steel. The USA original was, and this was what was available in the colour we wanted.
- S D2 To hide blemishes in the cabinet.
- TOS D3 A Litton recommendation; the vinyl finish tends to take more cleaning abuse than the paint finish. Also it gives a greater "dimension" to it, (meaning a more three-dimensional effect).

CONSENSUS SOMT

Question 23 Why does it have a textured finish?

Response:

- T U1 to prevent scratching
- T U2 less likely to be scratched or damaged
- S U3 decorative
- T U4 doesn't scratch easily (I like it)
- S U5 gives a feeling of richness
- TOM U6 cheaper to manufacture than a smooth finish - also it makes it impossible to paint it, which should not be attempted for technical reasons
- O U7 this is easier to clean
- T U8 because it is a protective coating (I like it)
- T U9 to stop chipping
- T U10 this is part of the protective coating; it has to be textured as a material

Question 24 Why are the corners slightly rounded?

Response:

- M D1 Because they could not be sharper, given the type of fabrication process.
- M D2 They have to be, as part of the manufacturing process.
- MT D3 Minimum radius for the metal bending fabrication technique - also, if it was any sharper it would tend to cut through the vinyl covering.

CONSENSUS MT

Question 24 Why are the corners slightly rounded?

Response:

- 0 U1 so that they will not be sharp and dangerous
- 0 U2 so that they will not scratch users
- 0 U3 safety, so that you don't scratch yourself
- 0 U4 so that they won't catch or scratch the user
- 0 U5 so that it will fit into spaces easier, eg built-in units
- TM U6 for manufacturing reasons to do with the type of finish
- 0 U7 safer - you cannot catch yourself and it is easier to grip when moving
- M U8 because the box is a folded metal sheet and the process automatically gives a slight rounded corner
- 0 U9 because they would be dangerous if not
- 0 U10 for safety if you bang into it

Question 26 Why are the door hinges in full view and
not hidden away?

Response:

- M D1 It was a well proven door and hinge - but I
think it would be better if they were not (in
full view).
- M D2 To reduce costs. (If we had full control we
would not design them like this.)
- M D3 For expediency (cheaper to produce); lack of
pressure from the design staff to push it the
other way.

CONSENSUS M

Question 26 Why are the door hinges in full view and
not hidden away?

Response:

- M U1 easier to get at from the servicing point of view
- OST U2 better appearance - and for technical reasons -
also food can be cleaned off easier
- M U3 easy to service and for manufacturing reasons
- M U4 so that they are easier to get at if they go
wrong
- O U5 so that you will be able to tell if anything is
wrong with them simply by looking at them - for
safety
- MT U6 mainly for cheaper manufacture; also metal cannot
be used inside the oven
- M U7 so that they are easier to fix if they go wrong
or get damaged
- O U8 for protection
- T U9 so that the door fits better
- O U10 there is less chance of being caught on them

Question 27 What is the purpose of the metal trim around
the door?

Response:

T D1 It is structural, it keeps the door right-angled
 and flat so that the three interlocks will engage
 properly and it will operate.
T D2 The extrusion is part of the door structure.
T D3 It holds the door parts together.

CONSENSUS T

Question 27 What is the purpose of the metal trim around
the door?

Response:

S U1 to improve the way that the product looks
T U2 to give the door strength
SO U3 for looks and protection
O U4 helps to seal the door
ST U5 to strengthen the door and to look good
T U6 it holds the glass in - stabilises the door
TSO U7 it improves the looks of the oven, seals it and
 provides a strong support for the door
O U8 to improve the efficiency of the seal
ST U9 to improve the looks and to strengthen the door
O U10 for safety - for microwave protection

Question 28 What is the purpose of the translucent strip
along the inside face of the oven?

Response:

S D1 Purely decorative, it was a visual device to
match the wood grain on the original oven.
T D2 It is a vapour seal, not a microwave seal.
It is made out of silicone rubber.
O D3 This is a microwave energy absorber. The door
does not seal tightly. The strip is 'T' section
and traps the emergent radiation and contains it
in the base of the 'T', where it is dissipated
as a slight heating effect. This energy is in
the form of the main frequency. Government
legislation determines that this is carried out.

CONSENSUS OST

Question 28 What is the purpose of the grey edging strip
along the inside of the door?

Response:

O U1 to seal the oven
O U2 to seal the door
S U3 decoration
O U4 to seal the door
M U5 plastic - perhaps comes out to clean - for some
manufacturing purpose, no idea what its real
purpose is
O U6 safety seal
O U7 to provide a good seal
O U8 to seal the door
O U9 to seal the door
O U10 this is the main microwave seal

Question 29 Why does it not match the colour of the rest of the interior?

Response:

S D1 To match the wood grain.
T D2 Because it is a different material.
TM D3 The seal is probably polypropylene and would be difficult to match to the cavity colour. Also 20% of the plastic is recycled and this would again make it difficult to match.

CONSENSUS TMS

Question 29 Why is it a grey colour and not white to match the rest of the interior?

Response:

O U1 so that I know what the seal is
T U2 because this is the stuff that has to be used and it happens to come in this particular colour
S U3 it wouldn't be as decorative if it was not this colour
OM U4 easier inspection and maintenance
Nil U5 no response
MT U6 for manufacturing reasons because it is a different type of plastic
T U7 it is a special, different material which provides a seal
T U8 it is a different material which has to be this colour
T U9 because it has to be a different material than the surround, which has to be that colour
O U10 so that you can see it better, you know that it is there

Question 30 What is the purpose of the flexible black strip along the inside of the door?

Response:

T D1 It is there to protect the microwave shield (mesh) from damage. (INCORRECT)
Nil D2 I did not know there was one - I have no idea.
0 D3 This is a secondary seal to absorb the second and third harmonic of the radiation which is not trapped by the other seal. These are multiples of 2450 MHz and hence would transgress government legislation, which restricts the frequency of microwave oven radiation to a limited frequency range - all ovens are tested in the USA on this point.

CONSENSUS 0

Question 30 What is the purpose of the black edging along the inside of the door?

Response:

0 U1 another seal to enable the door to fit more tightly
0 U2 this is to seal the door
0 U3 safety
T U4 to keep the 'glass' in
OT U5 seals the door and also cushions the door when it closes to prevent vibration
0 U6 a safety seal
0 U7 another seal
0 U8 to seal the door
0 U9 to seal the door
0 U10 this is the second microwave seal

Question 31 What is the reason for having three and not
just one door catch?

Response:

- 0 D1 For safety; if there was only one the door might be warped and would still operate. Also, with three interlocks, if a child pushed a pencil into one the oven would still not operate.
- 0 D2 For safety reasons - decided in the USA.
- 0 D3 It is a safety requirement, demanded in both the UK and the USA, three separate circuits must be closed for power to be on.

CONSENSUS 0

Question 31 What is the reason for having three and not
just one door catch?

Response:

- 0 U1 for safety, so that if one should break there would be no leakage
- 0 U2 prevents the door from warping and hence preserves the seal
- 0 U3 prevents the door from warping - also keeps the door shut properly
- 0 U4 safety
- 0 U5 if the door should twist, they will bring it back into shape and hence provide a good seal again
- 0 U6 for safety
- 0 U7 for safety
- 0 U8 for safety - to ensure that when it operates it is completely closed
- 0 U9 for safety
- 0 U10 for safety

Question 32 Why is the interior coloured white?

Response:

- M0 D1 It is white stove enamelling, which is cheaper than stainless steel and is a highly reflective colour.
- S0 D2 It looks clean, efficient and reflects light.
- S D3 White is a "clean" colour and also gives a visual impression of space.

CONSENSUS SOM

Question 32 Why is the interior coloured white?

Response:

- T U1 because white reflects the waves better
- O U2 easier to see into, because it reflects the interior lighting
- S0 U3 looks better; also a clearer when the interior is lit
- S U4 to enhance its looks
- O U5 so that light will be reflected and one will be able to see the contents more clearly
- O U6 to see the interior better
- OT U7 so that you can see inside more easily - also could be something to do with the way it works
- O U8 helps you to see what you are cooking more clearly because of the reflected light
- TMO U9 something to do with the rays - also cheaper to manufacture in this colour, also easier to see any spillage
- S U10 it is cleaner looking

Question 33 Why was this particular interior size chosen?

Response:

- T0 D1 This is related to microwave distribution. You choose the rough volume you want and then feed it into what is thought to be a highly reliable computer programme, which will give the optimum dimensions required, although it still has to be tested.
- Nil D2 I do not know.
- OT D3 This is a complicated decision to make; the varying of the three dimensions affects the evenness of the cooking. It was originally developed according to the size of certain American cooking dishes. Also, in sales terms, it was thought that an internal dimension greater than one cubic foot was desirable.

CONSENSUS OT

Question 33 Why is the interior space this particular size, and not either larger or smaller?

Response:

- T U1 for technical reasons
- O U2 because it will take a fair-sized turkey
- T U3 the magnetron can only cope with small quantities of food, so there is no point in a larger size
- O U4 convenient to use - can get a turkey in
- MT U5 for manufacturing reasons; also there is a limit to an acceptable weight
- O U6 useful size for most foods (we would now prefer it to be smaller)
- O U7 this size is adequate for most people's needs
- O U8 it suits most families - and costs the same as other, smaller sizes
- M U9 cheaper to manufacture this small size (related to a conventional oven size)
- O U10 it is a conventional size that is more useful to the family

Question 34 What is the purpose of the series of holes
in the inside, right hand panel?

Response:

T D1 For venting steam and cooking smells.
Nil D2 I do not know.
T D3 This is an air intake.

CONSENSUS T

Question 34 What is the purpose of the series of holes
in the right hand panel?

Response:

T U1 for ventilation
T U2 for ventilation and to prevent overheating of
 the oven
T U3 for ventilation
T U4 the microwaves enter through them
T U5 for ventilation
T U6 allows the microwaves to enter the oven
T U7 for ventilation
T U8 for ventilation
T U9 to extract the steam through
T U10 air vents to allow steam to escape

Question 35 Why are the inside corners not rounded,
as in most conventional ovens?

Response:

- MT D1 It is easier to manufacture - the ceramic base tray would pose problems because it is a different material to the sides and could not therefore be bent in one piece. The cleaning problems are less than in conventional ovens.
- M D2 They should be ideally, but it is cheaper to construct this way.
- TSO D3 It would only be possible to round some of the corners, since the back is not attached to the sides. The stylists favoured the crisp corners and it was felt that, because of the lack of heating effect, this would make it easy enough to clean. In conventional ovens, vitreous enamel is used, which is sprayed on, and this would not be possible in the microwave oven. The home economist had not defined a need for rounded corners.

CONSENSUS MOST

Question 35 Why are the inside corners not rounded,
as in most conventional ovens?

Response:

- T U1 for technical reasons
- T U2 to improve the door fit - and what the walls are made out of will not bend
- T U3 for technical reasons - rounded would be easier to clean
- Nil U4 easier to clean (probed on this, and said that rounded ones would be easier to clean)
- M U5 first stated easier to clean, then corrected to cheaper to manufacture this way
- M U6 for manufacturing reasons
- SO U7 it looks better - and it is easier to get stuff in and out
- T U8 because of the construction - for technical reasons
- M U9 cheaper to manufacture
- T U10 I don't know - for technical reasons

Question 36 Why is there no shelf in the interior, as in most conventional ovens?

Response:

- T D1 In general, food does not cook as efficiently at higher levels. The floor of the cooker is in fact a shelf, the metal bottom extends about an inch below. This is to put the food at the optimum position for cooking.
- T D2 It is related to the characteristics of microwave cooking.
- T D3 Because of the energy distribution which is engineered to focus on only one level. (Today the engineers are able to create three-dimensional cooking, so some of their new (Litton) ovens do have a single shelf.)

CONSENSUS T

Question 36 Why are there no shelves in the interior, as in conventional ovens?

Response:

- T U1 because, unlike conventional ovens, the top of the oven is no hotter than the bottom, and so there is no point in stacking food at different heights
- T U2 because with shelves you would get uneven cooking - the food on the top shelf would prevent the microwaves from reaching the bottom shelf
- T U3 because it is only possible to cook one quantity at a time
- T U4 because the microwave operates at one temperature and conventional ovens have different temperatures at different heights - plastic rings can be used to stack plates
- T U5 because if objects are placed on top, the microwaves will not reach those underneath
- M U6 to make the product more cheaply (we think it would be a good idea)
- O U7 there is no need for shelves
- T U8 can't, unless it was made out of plastic
- O U9 because of the speed of cooking, it is not necessary to stack food up
- T U10 because the microwaves could not distribute to the height of another shelf

Question 38 What material is the power knob made out of,
and why was this material chosen?

Response:

TM	D1	ABS, because it is reasonably durable, cheap and will plate easily.
T	D2	Chrome-plated ABS - chosen because it is a plastic that is easy to plate.
Nil	D3	It is a plastic, but I am not sure which one, not a low or a high temperature plastic. It obeys the normal constraints of manufacture.

CONSENSUS TM

Question 38 What material is the power knob made out of,
and why is it made out of this?

Response:

TO	U1	coated plastic - easier to clean, doesn't go rusty and for technical reasons, one should not have metal objects near to or in the oven
M	U2	plated plastic - because it is cheaper
T	U3	steel, for harder wear
M	U4	plastic, for cheaper manufacture
M	U5	plastic (but feels like metal), less strong than metal, used because it is cheaper
Nil	U6	a metal alloy
T	U7	stainless steel - for increased strength
T	U8	a man-made plastic - because metal and micro-wave do not go together
Nil	U9	first thought it was stainless steel - then chromium-plated - having examined them closely they concluded that they were plastic
O	U10	metal, for safety

Question 39 What material is the transparent door made out of, and why was it chosen?

Response:

- T D1 Glass - for durability.
- T D2 Glass (the control panel is plastic) - it is more durable and provides more stiffness for the door.
- T D3 The outer panel is glass because it does not scratch easily. The inner one is milar film because this forms a flexible part of the sandwich to enclose the front mesh screen.

CONSENSUS T

Question 39 What material is the door panel made out of, and why is it made out of this?

Response:

- T U1 perspex, because it is stronger than glass and will not shatter
- T U2 perspex - because it is tougher than glass and weighs less
- SOT U3 glass outside, plastic inside - glass looks better and is easier to clean, plastic for technical reasons
- O U4 perspex, for safety
- T U5 glass - because it is more durable than plastics
- T U6 glass - more heat resistant than plastic
- T U7 I do not know - not plastic, not glass - some durable material
- T U8 glass - because glass does not distort through heat
- M U9 plastic - cheaper to manufacture
- O U10 a special glass for safety - plastic would not be suitable

Question 40 What material is the white, outer case made out of, and why was this chosen?

Response:

- M D1 Plastic-coated steel - largely a cost factor.
The manufacturing plant does not have wide production facilities so the materials have to be bought in and ready-coated steel saves on painting.
- M D2 Plastic-coated steel - chosen mainly because of its relatively low cost.
- M D3 PVC-covered soft steel - this is the normal construction for cheap manufacture of cabinets and covers.

CONSENSUS M

Question 40 What material is the off-white case made out of, and why?

Response:

- T U1 plastic-coated metal - stronger and with a longer life
- T U2 metal - to keep the waves in
- T U3 plastic-covered steel for hard wear
- T U4 metal - hard wearing
- S U5 vinyl-covered metal - for appearance
- Nil U6 a metal alloy
- O U7 vinyl - because this is easier to clean
- T U8 vinyl over a metal case - to reflect the microwave
- T U9 plastic-coated metal - lasts longer and does not chip
- O U10 metal with a plastic coating, for safety

Question 41 What material is the base of the interior
made of, and why?

Response:

T0	D1	Glass ceramic - because it is tough, transparent to microwaves, and is easily cleaned.
Nil	D2	I do not know.
T	D3	This is glass/ceramic and forms a shelf with microwave energy coming up from beneath it. It must therefore be transparent to microwave energy, unlike the walls and roof of the cavity. It must also have a low coefficient of expansion, so that it may heat through conduction without expanding and breaking.

CONSENSUS OT

Question 41 What material is the base of the interior
made of, and why?

Response:

O	U1	feels like enamel-coated metal, for ease of cleaning
T	U2	a thick plastic - to take the extra weight of the food
T	U3	plastic - polystyrene - so that it does not heat up
M	U4	plastic - cheaper to manufacture
T0	U5	special material - plastic-coated steel for durability and easy to clean
T	U6	a plastic for better heat conductivity
T	U7	a mixture of polystyrene and ceramic material, to stand the heat
T	U8	metal, to reflect the waves
O	U9	plastic, so that it is easy to clean
OT	U10	some kind of perspex; it seems thick, chosen for safety and so that it will stand up to heat

Question 42 What materials are the walls of the interior
made of, and why?

Response:

M	D1	Stove-enamelled steel - because this is cheaper than stainless steel.
Nil	D2	I do not really know, but think they are some sort of plastic.
T	D3	Mild steel with a multiple coating - I do not know what of, but it is a two to three stage process. They reflect microwave energy.

CONSENSUS MT

Question 42 What materials are the walls of the interior
made of, and why?

Response:

T	U1	nylon, because metal cannot be used for technical reasons
T	U2	plastic-coated metal - to keep the rays in
T	U3	a more rigid plastic than the above - again, will not heat up
T	U4	metal - for durability
T	U5	painted steel, for durability
T	U6	metal, to reflect the microwaves
T	U7	metal - for structural strength
T	U8	metal, to reflect the waves
T	U9	like tin - a metal - to reflect the rays
T	U10	metal, to reflect microwaves

Question 43 What material is the interior roof made of, and why?

Response:

Nil D1 A plastic, I think it is PVC.
Nil D2 I do not know.
T D3 As 42.

CONSENSUS T

Question 43 What material(s) is the roof of the interior made of, and why?

Response:

O U1 again, enamel-coated metal for ease of cleaning
T U2 the same as above - plastic-coated metal - to
 keep the rays in
T U3 same as the walls - a more rigid plastic than
 the base - will not heat up
T U4 metal - will resist wear and tear
T U5 plastic to allow the radiation through
T U6 metal for reflecting the microwave
TO U7 plastic, to reduce the weight and to house the
 motor
Nil U8 plastic and metal - do not know
T U9 metal like the sides - to reflect the rays
T U10 two different materials, plastic/perspex and
 metal, for technical reasons

Question 45 Why is the oven so heavy for its size?

Response:

- T D1 The control gear, transformer and magnetron are all inherently heavy.
T D2 Because of the inherent weight of the magnetron.
T D3 A combination of the weight of the transformer and the magnetron.

CONSENSUS T

Question 45 Do you think the oven is light or heavy to lift - why is it so light/heavy?

Response:

- T U1 heavy, because there is so much metal inside it
T U2 heavy - particularly on the side where the magnetron is, so I would assume the magnetron is heavy
T U3 for technical reasons
T U4 because of the weight of the 'mechanism'
T U5 heavy, for technical reasons to do with the magnetron
Nil U6 average weight for its size
T U7 very heavy because of the weight of the magnetron
O U8 it is heavy so that it will be stable on uneven surfaces - I put it on an uneven surface once and it started flashing
T U9 heavy - because of the weight of the magnetron
O U10 heavy, for stability

Question 46 Why does it make a noise whilst operating?

Response:

- T D1 Two noises, the stirrer and fan noise and the magnetron itself. The transformer and magnetron are probably the noisiest.
- T D2 The magnetron is responsible for the noise.
- T D3 This is the blower noise.

CONSENSUS T

Question 46 Why does the oven make a noise when cooking?

Response:

- T U1 the extractor fan
- T U2 it is the noise of the microwave being generated
- OT U3 for technical reasons - also tells you that the oven is on - the timer also makes some noise
- T U4 the movement of the air through the fan - you can't have a silent fan
- T U5 I do not know, but it sounds like a fan
- T U6 because of the fan
- T U7 it is the noise made in generating the rays
- T U8 it is the noise of the concentrated radio waves being generated
- Nil U9 no idea
- T U10 the microwave generator causes this

Question 47 Why is the oven wall as thick as it is?

Response:

- T D1 At the bottom is the well, the stirrer is at the top, the hinge mountings at one side and the controls at the other. It is nothing to do with insulation or microwave screening.
- T D2 Because it determines the angle of reflection.
- T D3 As response D1.

CONSENSUS T

Question 47 Why is the oven wall so thick?

Response:

- O U1 to prevent microwave leakage
- TO U2 insulation - of heat and microwaves, for safety
- O U3 for safety and to prevent leakage of microwaves
- O U4 there are materials necessary for safety inside
- TO U5 the top roof because it carries the magnetron, and the walls for protection against leakage
- O U6 for safety and microwave insulation
- O U7 for protection
- O U8 for protection from the microwave inside
- O U9 to keep the rays in
- O U10 for safety - so that microwaves will not get out

**6.2 DESIGNER AND USER RESPONSES TO THE SUPPORT SECTION
OF THE QUESTIONNAIRE**

Question 3 What would you say are the main attractions of microwave cooking for consumers? (Would you rank these in order please)

Response:

- D1 Speed and convenience - a false optimism about the range of possible uses.
- D2 The speed of cooking and defrosting.
- D3 (a) Convenience and speed, which go together; the particular circumstances of the user accentuate the value of certain attributes, eg a family or working user may accentuate the need for increased cooking speed.
- (b) For children, better, more nutritious meals available outside normal cooking hours. Also it is safe to allow children to use it by themselves.
- (c) More nutritious and tastier foods, eg fish and vegetables.
- (d) 25 - 75% energy saved over electric cookers.

Pre-purchase and Purchase

3 Why were you originally attracted to the idea of microwave ovens?

- U1 the speed - I kept forgetting to take food out of the freezer
- U2 had a freezer - for both speedy defrosting and quicker cooking
- U3 I was working at the time and thought it would be useful for defrosting the things that I kept forgetting to defrost
- U4 the speed - I was working at the time of purchase, so needed the convenience
- U5 I had a freezer and wanted to speed up defrosting - saw a demonstration
- U6 some American relatives visited us and praised its convenience
- U7 we saw it at demonstrations - we both work, I work shift work, so we wanted it for convenience
- U8 became aware of them when they first came out 10 years ago; I work all day and thought that it would be convenient
- U9 saw a demonstration of the Creda at Coles and had seen ovens on the television, where it was portrayed as 'a thing of the future' - thought it looked useful
- U10 we own an allotment and got fed up with the amount of blanching of vegetables for the freezer - we thought there must be a quicker way and we looked at books on microwave cooking

Question 4 What are the main attractions of the Creda,
as opposed to other models available?
(Would you rank these in order please)

Response:

- D1 Good performance - at the time it was the only one in the UK with the variable control - and one of the largest interior capacities.
- D2 It appears to be, and is, bigger than most - also the variable power control.
- D3 Offers a variable power control which relates to the traditional use of gas and electric ovens. Some foods need to cook slower at low energy.

4 What attracted you to the Creda, as opposed to other makes or models?

- U1 liked the large size of the interior
- U2 the price related to the large size
- U3 I liked the variable power control
- U4 I liked the large size and the discount
- U5 knew that I could get it cheap from a warehouse called S & E, associated the Creda brand name with quality - liked the large internal size, simplicity and solidity
- U6 the variable power control - the size did not matter much
- U7 more room inside, the roasting tray and the variable power
- U8 went to Coles, asked them what model they would recommend for a family of five and they said the Creda would take five dishes stacked - also liked the variable power control
- U9 the price - there was a £10 special reduction - also the variable control; met a man at the demonstration who was re-buying an oven in order to have a variable power control
- U10 the large size, attractive looks and the browning tray

Question 6 As the idea of microwave cooking is fairly new to most people, in what ways would you expect prospective purchasers to find out about and obtain information on the oven?

Response:

- D1 Magazines, particularly "Which", and microwave books.
- D2 They would most likely become aware through looking in magazines at the advertisements (although recently Philips TV advertisements have become important).
- D3 The August 1978 "World in Action" broadcast, which had its equivalents in other parts of the world, converted a 20 to 30% knowledge into 90%, even though this was adverse. This in turn stimulated manufacturers to advertise to counter this (formation of the microwave oven manufacturers' association). Knowledgeable consumers first buy the oven assuming that the manufacturers' assertions are correct and then, by word of mouth, convey awareness to others. Sales demonstrations are important also.

6 Before you bought the oven, in what ways did you try to find out information, eg books, sales, leaflets, demonstrations, friends, etc?

- U1 only visited one shop but looked at lots of leaflets - did not know any other people who owned one at the time
- U2 Mrs P had used another model as a barmaid previously - they had no friends who have one - attended demonstrations - visited one or two stores
- U3 visited a number of shops - no demonstrations - had a friend who had one
- U4 asked a lot of people in shops - read many sales leaflets - did not know any other users
- U5 visited one shop - liked another more 'futuristic' one (with push buttons) and would have bought that but the sales people were slow to order - no known other users
- U6 Toshiba demonstrator at the local showrooms visited several times, very helpful - visited a number of shops - read the Toshiba recipe book
- U7 a Creda demonstration at Coles - saw it in the shops
- U8 spent a long time looking around many shops - saw a couple of demonstrations, did not have any friends who owned one
- U9 visited three or four stores - we went into it thoroughly and attended a demonstration of several makes of cooker
- U10 looked at books, attended a YEB demonstration - did not know anyone who owned one

Question 7 I would like you to tell me which of the following you would expect to be the most important factor in influencing prospective users: (i) LISTENING to what friends or salesmen said about the oven; (ii) READING about the oven in books, magazines, etc; (iii) LOOKING at the oven in the shops or pictured in magazines. Which would be the second most important?

Response:

- D1 (i) then (ii).
D2 (ii) then (i).
D3 (i) - unable to provide second because not that familiar with the UK market.

7 Which of the following do you consider to be the most important in deciding to buy the oven: (i) listening to what friends or salesmen said about the oven; (ii) reading about the oven in books, magazines, instructions; (iii) looking at the oven in shops or pictured in magazines?

	Most important	Next important	Least important
U1	(ii)	(i)	(iii)
U2	(iii)	(ii)	(i)
U3	(ii)	(iii)	(i)
U4	(iii)	(ii)	(i)
U5	(iii)	(ii)	(i)
U6	(i)	(ii)	(iii)
U7	(i)	(ii)	(iii)
U8	(i)	(iii)	(ii)
U9	(i)	(ii)	(iii)
U10	(ii)	(i)	(iii)

Question 8 Compared with other consumer durables, would you say that choosing a microwave oven is generally (i) more difficult, (ii) about the same, (iii) easier?

Response:

- D1 (i).
D2 (i).
D3 (i) - because there is no awareness and understanding of the product features.

8 Compared with other products that you may have bought, like furniture, electrical goods, cars, etc, would you say that choosing a microwave oven was easier or more difficult? Why do you say that?

- U1 about the same as most others
U2 about the same
U3 about the same as buying any other product
U4 about average
U5 more difficult because I was not sure what the oven would do for me personally, unlike the other products that I have bought
U6 did not find it difficult, but might have if we had not received advice from our American relatives
U7 it was an easy decision to make
U8 it was, if anything, easier because there was not a great deal to choose from
U9 about the same as other purchases - we always go into things thoroughly
U10 more difficult, because we did not know anything about it - when we first bought it I thought that it was a big mistake because I did not know how to use it and felt it was frightening, although it has now proved worthwhile particularly in the blanching process (we bought a pea podder and can do very large quantities very quickly)

Learning to Use the Product

Question 10 Would you say that the average user:
(i) read all the instructions before use;
(ii) read a few of the instructions before
use; (iii) read none of the instructions
before use?

Response:

- D1 (i).
D2 (ii).
D3 (i) - this is for the UK user; they are more thorough
in reading instructions than Americans - main problem
in the US was consumer understanding and we provide
a freephone service for advice to counter this.

Learning to Use the Product

10 When you first bought the product, would you say that:
(i) you read all the instructions before using it;
(ii) you read a few of the instructions before using
it; (iii) you read none of the instructions before
using it?

- U1 the instruction booklet is fine but I have not used
any of the recipes - (i)
U2 (ii)
U3 (i)
U4 (i)
U5 (i)
U6 (i)
U7 (i)
U8 (i)
U9 (i)
U10 (ii) - my husband read them all

Question 11 What would you expect to be the most common difficulties and mistakes made by users when they first operate the oven?

Response:

- D1 The pre-planning and organising of menus.
- D2 People would expect too much from them - and would not study the instructions properly.
- D3 Underestimating how fast the cooker cooks, and therefore a tendency to overcook food. Also the association of textures and colours after cooking with the traditional appearance of food tends to mislead the user as to the correct cooking times.

11 Everybody makes mistakes when they first use a microwave oven. What kind of difficulties did you have when you first learned to use it?

- U1 accidentally cooked a piece of frozen meat that I only wanted thawing; also, a couple of times, I have put food in and set the controls and nothing has happened to the food - suspect that the machine is faulty
- U2 found, and still find, sponge cakes extremely difficult; found the instructions supplied perfectly adequate, but have bought several other books which, in some ways, are difficult to relate to the Creda power settings
- U3 overcooked a tinned steamed pudding - melted some Tupperware containers - still can't do fried eggs - don't like choice of recipes - not enough information
- U4 cooked a cake in too small a dish - overflowed, not successful, too soggy
- U5 I normally went by the book; dried out some hamburgers
- U6 nothing particular - cooked a potato too slowly to begin with
- U7 we tried to make fresh bread in it, which was a disaster
- U8 I was always a bit afraid of using it because of the safety thing, which is always at the back of my mind (Mrs S enquired about portable leakage detectors); cooked eggs on the roasting tray, which were a disaster - not keen on using the tray, I do not like the channel around it, would prefer channels going right across
- U9 made a mess of a Yorkshire pudding - cooked a cauliflower with no liquid; do not feel that the recipe book is explicit enough - we have looked for, but not discovered, a good general book on microwave cooking (it can never replace a conventional oven) - we do not use the oven a great deal, in fact it is really a bit of a white elephant (Mr T)
- U10 overcooked and spilt custard all over the oven; I cooked a sponge cake in too small a container so that it overflowed; burnt hands on roasting tray (see later question)

Question 12 Is there anything that you now feel could have been modified in the oven that would have made it easier to learn to use, eg more instructions on the product itself or different control arrangements?

Response:

- D1 A meat probe included; a more accurate digital timer. Improved literature with the product - it takes too long to understand the instructions, could be better detailed.
- D2 Possibly touch controls, for digital rather than analog control of time and power.
- D3 A visible cooking guide for a small range of common foods. Improved browning effect, matching cooking time to traditional appearance. A list of deficiencies (what the product will not do), eg cooking at different levels is not efficient.

12 Is there anything that can be done to the product that would make it easier to learn to use, like perhaps more instructions on the product itself or different types of controls?

- U1 no response - 'it is bound to be trial and error'
- U2 no - not particularly keen on instructions written on the product
- U3 useful to have instructions for cook times of foods actually on the oven - do not like the choice of recipes in the instruction book
- U4 more books on microwave cooking required (although thought the instruction book was adequate); more instructions on the actual packets of frozen foods - suspicious of printing more instructions on the oven itself because the oven would look less attractive and they always wear off
- U5 no - as long as you follow the instructions and get the weights right there is no problem
- U6 not in favour of putting more instructions on the product because the dials would have to be bigger; very critical of the instruction booklet - had bought 3 other books but not much use, as the models were always different than the books; Creda recipes are too complicated, much preferred the Toshiba instructions; also liked cookery cards - there ought to be better books
- U7 no, it is already simple to use - I am not in favour of more instructions on the product
- U8 would like a proper recipe index in the instructions, which are adequate in general; I have tried a number of recipes - I like the Toshiba because it had some instructions written on it - particularly useful for the children who use it - they know the controls but not necessarily the cooking times

- U9 it is already very simple to use; Mrs T was a little bit afraid to use it
- U10 I do not like more instructions on the oven because they always wear off; I found it frightening to begin to learn; you get used to taking containers out of the oven with bare hands, as they are relatively cool, and forget that the roasting tray is different - there is no warning about handling it - I burnt myself quite badly; at the demonstration you also see the containers handled by hand

Product Identity/Style

Question 13 The style of a motor car can be described using a variety of words, eg sporty, sleek, compact, luxurious, etc. What words would you use to describe the style of the oven?

Response:

- D1 De luxe, modern.
- D2 Reasonably smart within the USA constraints.
- D3 "Comfortable" - products in the kitchen should look "functional" but the UK is not yet ready for the extreme form of functionality, as exhibited by some of the German products. The oven also has the appearance of having value. The UK is also slow at adopting built-in appliances.

Product Identity/Style

13 The style of a motor car can be described using a variety of words, eg sporty, sleek, compact, luxurious, etc. What words would you use to describe the style of the oven?

- U1 no response, even after probing 'I like it'
- U2 quite elegant, solid looking
- U3 all right, nice to look at - good - bigger
- U4 compact, neat, attractive
- U5 modern - straightforward, simple, compact, simple control layout
- U6 not sleek - don't know - we never really look at it - 'useable', a bit big, wish it was smaller but like the appearance, looks like a television set
- U7 nice - I like the black front - the dials are simple, easy to read
- U8 this is very difficult at a moment's notice - it is plain and fits in well
- U9 no opinion - all right - a bit like a television, looks 'cold'
- U10 great, I like it, it fits in well

Question 14 I would like you to look at these photographs of other microwave ovens. Do you prefer the look of either of them to the Creda? Why do you prefer it?

Response:

- D1 I like A because I have seen it in the flesh; I do not like this photograph of it. C looks out of date.
D2 I prefer A, it is a designer's design, better integrated, more sophisticated, rather like hi-fi equipment.
D3 I prefer the Philips "continental" styling, but not sure that this is suitable for the UK market. B is busy, C is clean and not cluttered.

14 I would like you to look at these photographs of other microwave ovens. Is there one that you prefer the look of, rather than the Creda? Why do you prefer it?

(If the answer is no, ask about a particular feature)

- U1 do not like the food cooking instructions of the top of oven A; I prefer the simplicity of the Creda to either; like the wood-grain finish on B, would like to have it on the Creda
U2 A doesn't look as good as the Creda - B is as good looking, B also looks as if it would tell me more about what is going on; like the turn-table on B, I wish that I had now chosen an oven with a turn-table
U3 likes B because the controls are more attractive - door handle looks nicer
U4 don't like B - the door handle is too big; like A just as much as the Creda
U5 like B if it has, as it looks to have, a turn-table; the others look too complicated to use
U6 prefer the Creda to either of them - like the simpler look of the controls; the Creda looks neater
U7 no - still prefer the Creda - do not like the turn-table on the Toshiba
U8 I prefer the general simplicity of the Creda to either of these, I think that simplicity is particularly important for older people; I particularly do not like the flush control panel of illustration A
U9 B looks more complicated - do not like that; Mr T liked the look of the Philips
U10 I still prefer the Creda - the Philips looks as if it has too many gadgets and gimmicks; I have seen B in the shops, it looks too "squashed up", too complicated I mean

Question 15 How, if at all, would you improve the way
the Creda looks?

Response:

- D1 The control panel needs a great deal of improvement, I do not like its colours - the door section is okay.
- D2 I would improve the depth of the front - at the moment it is merely an applied surface or facade. I would make it look more three-dimensional, which would give it a greater feeling of solidity.
- D3 Move away from blacks into browns, or perhaps even beige - warmer colours used.

15 How would you improve the way the Creda looks?

- U1 only have a wood-grain finish
- U2 no response
- U3 no response - apart from different cooking time for meats displayed on the oven
- U4 no response
- U5 I like its simplicity already, you could not make it simpler
- U6 make a variety of colours and finishes available - like the coloured appliances available in the US - about time they were available over here - Mr C
- U7 I am satisfied with the way it looks - I am more concerned that it gives good service
- U8 I would like to have a separate on/off switch
- U9 I like its simplicity - would prefer a more cylindrical switch, as on their conventional cooker - would look less cold
- U10 I would alter the power control - bigger writing spread out from the control knob; I would add a pointer to the switch - when my glasses steam up, frequently I cannot see the switch position clearly

Question 16 What would you say is the least attractive
feature of the oven?

Response:

- D1 The controls.
- D2 The door handle.
- D3 The control panel could be "fresher", as in the new
Litton (see Illustration 1010) with wood grain.

16 What is the most ugly feature of the oven?

- U1 the front to back distance is too long - ideally I
would set it into the kitchen wall but my neighbour
would probably object
- U2 the rather flimsy knobs
- U3 the metal rim that surrounds the control panel
- U4 nothing particularly ugly (in spite of several probes)
- U5 the piece of wood on the door edge
- U6 nothing - perhaps the colour
- U7 the switches
- U8 the knobs look weak - I would prefer a more cylindrical
shape
- U9 the switch knobs
- U10 I have never really thought that it could be an ugly
oven; I do not like the way that the hinges stick out

Question 17 Would you say that generally the oven is
(i) ugly, (ii) good looking, (iii) of
average looks?

Response:

D1 Average (although the door is good).
D2 Average looks.
D3 Good looking.

17 Would you say that the oven is generally (i) ugly,
(ii) good looking, (iii) of average looks?

U1 (iii)
U2 (ii)
U3 (iii)
U4 (iii)
U5 (ii)
U6 (iii)
U7 (ii)
U8 (ii)
U9 (iii) - we didn't consider the looks a great deal
 but were impressed by the large internal space
U10 (ii)

Question 18 Are there any aspects of the way the oven looks that you feel would not fit in with the decor and appliances found in the average user's kitchen?

Response:

- D1 The controls.
- D2 No - I think it would blend in well, particularly the dark browns that we settled on.
- D3 I do not know.

18 Is there any aspect of the way the product looks that you feel does not fit in with your kitchen decor or other appliances?

- U1 it was the last thing in the kitchen that we have bought and matches well, especially the smoked glass door
- U2 no - it is sufficiently neutral to go with anything - especially like the plain dark glass
- U3 no
- U4 the cream colour does not match my other appliances
- U5 no, it would fit into any kitchen
- U6 the large size
- U7 my wife says she would prefer a true white finish to match the other appliances in our kitchen
- U8 no, the colour blends in very well
- U9 no
- U10 no - but I would like a bigger inside space and smaller outside - thinner walls

Question 19 In general would you say that, in visual terms, the oven would fit in (i) very well, (ii) moderately well, (iii) not well, with the average user's decor and other appliances?

Response:

D1 Moderately well.
D2 Moderately well.
D3 I do not know.

19 In general does its style fit in (i) very well, (ii) moderately well, (iii) not well?

U1 (i)
U2 (i)
U3 (ii)
U4 (i)
U5 (i)
U6 (ii)
U7 (i)
U8 (i)
U9 (i)
U10 (i)

Question 20 Do you feel that any of the features have
a low quality finish or standard of work-
manship?

Response:

- D1 The plated knobs.
- D2 There are quite a number of examples of bad detailing:
gaps between the outer case and the front, the way
the hinges are screwed on and the feel of the door
handle.
- D3 Of course not.

20 Do any of the features have a low quality finish or
standard of workmanship?

- U1 no
- U2 the timer is not particularly reliable - the gap
between the door and the control panel tapers;
the timer over a range of say 15 minutes may be up
to three or four minutes out
- U3 the steel outside panel has developed a gap, with a
certain amount of give
- U4 no
- U5 no
- U6 the texture of the outer case
- U7 no
- U8 the bell doesn't always work and the timer does not
always return to zero but stops at around the 30 second
mark - this makes it difficult to actually cook things
like frozen breadcakes, which only need 30 seconds
- U9 there is play in the door (when we first purchased the
oven it failed to operate and we were supplied with a
replacement)
- U10 I do not think so

Question 21 Would you say that the quality of finish or standard of workmanship of the oven is (i) high quality, (ii) of average quality, (iii) low quality?

Response:

D1 (i) high quality.
D2 (ii) average quality.
D3 (i) high quality.

21 Would you say that the quality of finish or standard of workmanship of the oven is (i) high quality, (ii) average quality, (iii) poor quality?

U1 (ii)
U2 (ii)
U3 (i)
U4 (i)
U5 (i)
U6 (ii)
U7 (i)
U8 (i)
U9 (ii)
U10 (i)

Question 22 Which parts of the oven would you say are
the most difficult to clean?

Response:

- D1 The plastic cover on the interior roof; also the interior corners are a bit difficult.
- D2 The crevice around the door.
- D3 The control panel - newer models now feature touch controls which make this easier.

22 Which parts of the oven are the most difficult to
clean?

- U1 the gaps between the seal ring and the rest of the oven interior; also always tend to get a streaky effect on the glass door
- U2 the inside face of the door, around the black plastic lip, and outside the door, around the door trim
- U3 the inside corners and the door seals
- U4 the inside roof, because of the light and vent holes
- U5 splashes on the sides, top and back, although I cover everything so this does not happen
- U6 the ceiling surface inside and the textured outside finish
- U7 the grill on the roof inside
- U8 the control panel - food can lodge behind the switches and metal trim; also the door glass bubbles up when in use - is this harmful?
- U9 it is all very easy to clean - have not found anywhere where food lodges
- U10 the inside roof, because of the plastic grill

Question 23 Would you say that in general the oven is
(i) quick and easy to clean, (ii) difficult
to clean, (iii) average?

Response:

D1 (i) quick and easy to clean.
D2 (i) quick and easy to clean.
D3 (i) quick and easy to clean.

23 Would you say that in general the oven is (i) quick
and easy to clean, (ii) difficult and time-consuming
to clean, (iii) average?

U1 (i)
U2 (i)
U3 (i)
U4 (i)
U5 (i)
U6 (i)
U7 (i)
U8 (i)
U9 (i)
U10 (i)

Question 24 Which visible parts of the oven would you expect to show signs of wear and tear first?

Response:

- D1 The plastic inner door liner - the interior stove enamelling.
- D2 The perspex control panel, which would begin to show scratches when cleaned with abrasive cleaners. It would cause static, which would attract dust and hence cause more cleaning.
- D3 The controls, switches and the door release bar.

24 Which visible parts of the oven would you expect to show wear and tear first?

- U1 the door handle
- U2 the three door catches and hinges - if someone leans on the door
- U3 the door handle
- U4 the door handle release
- U5 the switches
- U6 the door - because it is always being wiped down
- U7 the door - at the hinges if someone was rough with them
- U8 the control knobs - they look as if they will easily break off
- U9 the door - hinges, locks and seals
- U10 the controls

Question 25 Would you say that the oven is generally
(i) robust and durable, (ii) of average
durability, (iii) not particularly durable?

Response:

D1 (i) robust and durable.
D2 Between (i) and (ii).
D3 (i) robust and durable.

25 Is the product generally (i) robust and durable,
(ii) of average durability, (iii) not particularly
durable?

U1 (i)
U2 (i)
U3 (i)
U4 (i)
U5 (i)
U6 (i)
U7 (i)
U8 (i)
U9 (ii)
U10 (i)

Question 26 What aspect of the oven would you consider
to be least safe?

Response:

- D1 None - the door seal - the use is outside our control
 (the plastic liner does not have to be airtight).
- D2 It is generally safe, unable to comment further.
- D3 The projecting open door - heads caught on it or
 running children colliding with it.

26 What aspect of the oven would you consider least
safe?

- U1 the possibility of leakage - also children (has two)
 accidentally operating the oven; I would prefer the
 controls to be on the top for this reason
- U2 the possibility of leakage, although in general it
 is a safe product because there is less risk of burn-
 ing, especially with children (ours use it)
- U3 children standing near the front - danger from leakage -
 also leaving it plugged in
- U4 thought it was totally safe - 'the manufacturer should
 not shoulder all the responsibility for safety - it
 is my responsibility to make sure that it is operated
 correctly'
- U5 the way that the door fits - it could be strained,
 especially by children
- U6 the bell sounds before the timer is exactly at zero -
 Mrs C worries that the oven is still operating because
 the indicator is never dead on zero
- U7 the danger of leakage through the seals - I am going
 to have it regularly checked
- U8 I can see the light coming through a gap between the
 top, outer case and the metal trim and I worry about
 this being a source of leakage; also the oven did not
 appear to be Electricity Board approved, and again
 this worried me
- U9 the door seal - I always move away from it when it is
 operating because of the risk from radiation
- U10 small children being able to open it too easily

Question 27 In general, would you say that the oven is
(i) very safe, (ii) moderately safe, (iii)
unsafe?

Response:

D1 (i) very safe.
D2 (i) very safe.
D3 (i) very safe.

27 In general would you say that the oven is (i) very
safe, (ii) moderately safe, (iii) unsafe?

U1 (ii)
U2 (i)
U3 (i)
U4 (i)
U5 (i) - aware of the safety problem but thought the
fact that it would rarely cause burns was in its
favour
U6 (i) - 'fitting the plug is the most safety risking
operation'
U7 (i)
U8 I cannot judge this
U9 (ii) - the dangers are always at the back of their
mind, especially as the handbook indicated possible
leakage from broken seals
U10 (i) - I hope it is

Question 28 Which of the following features would you expect the average user would like to see incorporated in the product if the extra cost was small?

- (i) The oven automatically detects any spillage of liquid or food and switches itself off - eg so that boiling over is prevented.

Response:

D1 No.
D2 No.
D3 Yes.

28 Which of the following features would you wish to have incorporated in the oven if the extra cost was small? (I shall read out the list, then repeat it slowly so that you can indicate 'yes' or 'no' to each feature)

- (i) The oven automatically detects any spillage of liquid or food and switches itself off - eg so that boiling over is prevented.

U1 no
U2 no
U3 no
U4 yes
U5 no
U6 no
U7 yes
U8 no
U9 no
U10 no

Classified Results

Design responses:

no D1, D2
yes D4

User responses:

no U1, U2, U3, U5, U6, U8, U9, U10
yes U4, U7

(ii) The oven cannot be switched on when empty.

Response:

D1 Yes.
D2 No.
D3 No.

(ii) The oven cannot be switched on when empty.

U1 yes
U2 no
U3 yes
U4 no
U5 yes
U6 yes
U7 yes
U8 yes
U9 yes
U10 yes

Classified Results

Design responses:

no D2, D3
yes D1

User responses:

no U2, U4
yes U1, U3, U5, U6, U7, U8, U9, U10

(iii) The oven cannot be switched on with metal objects inside.

Response:

D1 Yes.
D2 Yes.
D3 No.

(iii) The oven cannot be switched on with metal objects inside it.

U1 yes
U2 yes
U3 yes
U4 no
U5 yes
U6 no
U7 no
U8 yes
U9 yes
U10 yes

Classified Results

Design responses:

no D3
yes D1, D2

User responses:

no U4, U6, U7
yes U1, U2, U3, U5, U8, U9, U10

(iv) The oven is self-cleaning.

Response:

D1 No.
D2 No.
D3 Yes.

(iv) The oven is self-cleaning.

U1 no
U2 no
U3 no
U4 no
U5 no
U6 yes
U7 no
U8 no
U9 no
U10 yes

Classified Results

Design responses:

no D1, D2
yes D3

User responses:

no U1, U2, U3, U4, U5, U7, U8, U9
yes U6, U10

(v) The oven has a built-in thermometer that can be inserted into foods.

Response:

D1 Yes.
D2 Yes.
D3 Yes.

(v) The oven has a built-in thermometer that can be inserted into food.

U1 yes
U2 no
U3 no
U4 no
U5 no
U6 yes
U7 yes
U8 yes
U9 yes
U10 yes

Classified Results

Design responses:

no
yes D1, D2, D3

User responses:

no U2, U3, U4, U5
yes U1, U6, U7, U8, U9, U10

- (vi) The oven can be programmed so that the power cycle can be changed automatically, eg when defrosting the power can go from defrost to cooking without resetting.

Response:

D1 Yes.
D2 No.
D3 Yes.

- (vi) The oven can be programmed so that the power cycle can change automatically, eg when defrosting the setting can go from low power to high without resetting.

U1 no
U2 yes
U3 yes
U4 no
U5 yes
U6 yes
U7 no
U8 yes (note: as long as it has a manual over-ride)
U9 no
U10 no

Classified Results

Design responses:

no D2
yes D1, D3

User responses:

no U1, U4, U7, U9, U10
yes U2, U3, U5, U6, U8

(vii) A turntable is included to rotate the food automatically.

Response:

D1 No.
D2 No.
D3 Depends on experience in use.

(vii) A turntable is included to rotate the food automatically.

U1 no
U2 yes
U3 no
U4 no
U5 yes
U6 no
U7 no
U8 yes
U9 yes
U10 no

Classified Results

Design responses:

no D1, D2
(no response - D3)

User responses:

no U1, U3, U4, U6, U7, U10
yes U2, U5, U8, U9

(viii) The oven gives a warning if any microwave leakage occurs.

Response:

D1 Yes.
D2 Yes.
D3 Yes.

(viii) The oven gives a warning if any microwave leakage occurs.

U1 yes
U2 yes
U3 yes
U4 yes
U5 yes
U6 yes
U7 yes
U8 yes
U9 yes
U10 yes

Classified Results

Design responses:

no
yes D1, D2, D3

User responses:

no
yes U1, U2, U3, U4, U5, U6, U7, U8, U9, U10

(ix) The oven can be set to stir liquids whilst cooking.

Response:

D1 Yes.
D2 Yes.
D3 Yes.

(ix) The oven can be set to stir liquids whilst cooking.

U1 no
U2 yes
U3 yes
U4 no
U5 yes
U6 yes
U7 no
U8 yes
U9 no
U10 no

Classified Results

Design responses:

no
yes D1, D2, D3

User responses:

no U1, U4, U7, U9, U10
yes U2, U3, U5, U6, U8

6.3 GENERAL RESULTS OF THE SUPPORT QUESTIONS

6.3.1 MATCHED FACTORS

- Q 3 "Speed and Convenience" were perceived as important pre-purchase attractions for microwave cooking.
- Q 4 Variable power control and large cavity size were perceived as important pre-purchase factors of the Creda oven, compared with other models.
- Q 6 The main sources of pre-purchase information: sales demonstration, word of mouth and books on the subject.
- Q 7 Listening, reading, looking - their relative influence on the pre-purchase decision: too inconclusive and scattered to provide evidence.
- Q 8 Ease of choice compared with other durable purchases: designer and user responses do not match.
- Q 10 Reference to the written instructions before use: reasonable match between designers and users, who both believe that all the instructions are read prior to use.
- Q 11 Most common difficulties and mistakes during the initial period of use: over-estimation of product capabilities, overcooking of food.
- Q 12 Modifications that would make the product easier to learn to use: improved instructions.
- Q 13 Word description of product identity/style: "modern, reasonably smart" matches "neat and attractive".
- Q 14 Visual preferences related to two competing models: almost total mis-match.
- Q 15 Methods of improving the visual quality of the product: colour changes, changes in controls.
- Q 16 Least attractive feature of the oven (visual): the controls.
- Q 17 General attitude to product appearance: close match between average/attractive, with neither users nor designers expressing the option "ugly".
- Q 18 Compatibility with environment/other appliances: matching high number of nil responses by both users and designers.
- Q 19 General attitude to visual compatibility: no matching responses.

- Q 20 Features with a low quality finish or standard of craftsmanship: no response match of one designer and 5 users; gap between outer case and door.
- Q 21 General attitude to quality of finish/standard of workmanship: close matching between average and high quality, with neither users nor designers expressing a "low quality" response.
- Q 22 Parts of the oven most difficult to clean: interior roof, interior corners, door seals.
- Q 23 General attitude to cleaning the product: total match for response (i), quick and easy to clean.
- Q 24 Anticipation of characteristics which will exhibit signs of wear and tear first: the controls, power and timer; door release bar; door panel.
- Q 25 General attitude to product durability: close matching between "robust and durable" and "average durability", with neither designers nor users expressing the response "not particularly durable".
- Q 26 Least safe aspect of the oven: one design nil response and one user nil response; the door seal.
- Q 27 General attitude to product safety: "very safe" total design consensus matched the majority of user responses.
- Q 28 Design prediction of future user product requirements: close matching of leakage indicator, thermometer as desirable; close matching of spillage detector, self-cleaning, turntable as undesirable.

6.3.2 UNMATCHED FACTORS - DESIGN RESPONSES

- Q 3 Principal attractions of microwave cooking: nutritional value of cooked food; user safety, especially for children, improved taste, energy saving.
- Q 4 Pre-purchase attraction of the Creda oven compared with other models: none.
- Q 6 Sources of pre-purchase information: magazines.
- Q 7 Listening, reading, looking - their relative influence on the pre-purchase decision: too inconclusive and scattered to provide evidence.
- Q 8 Ease of choice compared with other durable purchases: designer and user responses do not match - the design group unanimously assumed that the user group would find the pre-purchase choice more difficult than for most other consumer durables, whilst the majority of users stated that it was a very similar process.
- Q 10 Reference to written instructions prior to use: reasonable match.
- Q 11 The most common difficulties and mistakes during the initial period of use: pre-planning and organising menus.
- Q 12 Modifications that would make the product easier to learn to use: a meat probe, a more accurate digital timer, touch controls, visible cooking guide, improved browning.
- Q 13 Word description of product identity/style: de luxe, comfortable, not as functional looking as many German products, appearance of having value.
- Q 14 Visual preferences related to two competing models: unlike the user group, a preference for the Creda over the other models was not directly expressed by the designers. Strong dislike of B because "it looks out of date", "it is busy"; identification of A as a designer's design, better integrated, more sophisticated, rather like hi-fi equipment, continental styling.
- Q 15 Methods of improving the visual quality of the product: a more three-dimensional frontal design.
- Q 16 Least attractive visual feature of the oven: the door handle.

- Q 17 General attitude to product appearance: close match.
- Q 18 Compatibility with environment/other appliances: incompatible controls.
- Q 19 General attitude to visual compatibility: no matching responses.
- Q 20 Features with a low quality finish or standard of craftsmanship: the plated knobs, the way that the hinges are screwed on, the feel of the door handle.
- Q 21 General attitude to quality of finish/standard of workmanship: close match.
- Q 22 Parts of the oven most difficult to clean: control panel.
- Q 23 General attitude to cleaning the product: close match.
- Q 24 Anticipation of characteristics which will exhibit signs of wear and tear first: the cavity wall finish, perspex control panel.
- Q 25 General attitude to product durability: close match.
- Q 26 Least safe aspect of the oven: the projecting door when open, because of the possibility of collision by passing user, causing possible injury and/or microwave leakage from damaged door.
- Q 27 General attitude to product safety: close match.
- Q 28 Design prediction of future product requirements: see page 81.

6.3.3 UNMATCHED FACTORS - USER RESPONSES

- Q 3 Principal attractions of microwave cooking: the blanching of home-grown vegetables.
- Q 4 Pre-purchase attraction of the Creda oven compared with other models: the Creda brand name, the price factor, simplicity, visual attractiveness, the browning tray, "solidity".
- Q 6 Sources of pre-purchase information: sales literature, enquiries at sales outlets.
- Q 7 Listening, reading, looking - their relative influence on the pre-purchase decision: too inconclusive and scattered to provide evidence.
- Q 8 Ease of choice compared with other durable purchases: see response 6.3.2 8.
- Q 10 Reference to written instructions prior to use: reasonable match.
- Q 11 The most common difficulties and mistakes during the initial period of use: suspected product malfunctions, difficulty in estimating thawing times, relating general literature on the subject to the use of the Creda, melted food containers, the use of containers that are too small, difficulty in using the browning tray, fear of safety factors.
- Q 12 Modifications that would make the product easier to learn to use: visible warning for the use of the roasting tray.
- Q 13 Word description of product identity/style: "like a television", big, bigger, compact, fits in well, simple, simple control layout, simple dials, plain, solid looking, not sleek, usable, cold.
- Q 14 Visual preferences related to two competing models: see responses under 6.3.2 14.
- Q 15 Methods of improving the visual quality of the product: nil.
- Q 16 Least attractive visual feature of the oven: the front to back distance is too great, the metal rim surrounding the door panel, the piece of wood on the door edge, the colour, the projecting door hinges, the control knobs.
- Q 17 General attitude to product appearance: close match.

- Q 18 Compatibility with environment/other appliances: off-white case colour, the size, requires a bigger inside cavity space and smaller outside walls.
- Q 19 General attitude to visual compatibility: no matching responses.
- Q 20 Features with a low quality of finish/standard of workmanship: taper on the gap between the door and the control panel, unreliable timer, play in the door, the texture of the outer case.
- Q 21 General attitude to the quality of finish/standard of workmanship: close match.
- Q 22 Parts of the oven that are the most difficult to clean: the glass door, the textured case finish, general splashes on the cavity walls.
- Q 23 General attitude to cleaning the product: close match.
- Q 24 Anticipation of those characteristics which will exhibit signs of wear and tear first: the door seals, the door locks, the door hinges.
- Q 25 General attitude to product durability: close match.
- Q 26 The least safe aspect of the oven: leaving the unit plugged into the mains supply, the oven still on when the timer indicates zero, operation by children, microwave leakage.
- Q 27 General attitude to product safety: close match.
- Q 28 Design prediction of future product requirements: see page 81.

6.4 SPECIMEN USER AND DESIGNER QUESTIONNAIRES

PERCEIVABLE CHARACTERISTIC AND SUPPORT QUESTIONNAIRES

CONTROL INTERFACE

- 1 What is the red light for?
- 2 Why is it red rather than any other colour?
- 3 Why is it rectangular and not round, for example?
- 4 Why is the power knob smaller than the time knob?
- 5 Why does it have a metallic finish?
- 6 Why does the power SCALE only extend around part of the circle?
- 7 Why does it have a part-orange, part-yellow circle around it?
- 8 Why is the time switch above and not below the power switch?
- 9 Why does the minute scale get larger the nearer it gets to zero?
- 10 Why does it have an orange circle around it?
- 11 Why does it go up to 30 minutes and not a greater or lesser time?
- 12 Why is the oven door release mounted on the control panel and not on the door?
- 13 Why is the door release this particular shape?
- 14 Why does it have a textured finish?
- 15 Why does the door have a fine mesh across it?
- 16 Why does the door have a thick dark band around it?
- 17 Why is the control panel this colour?
- 18 What is the thin line around the panel for?
- 19 Why is the control panel at the side of the door and not above or below it?
- 20 Why is there a gap between the door and the control panel?
- 21 (Space for extra control interface question.)

PRODUCT ENCLOSURE

- 22 Why was off-white chosen as the colour for the outer case?
- 23 Why does it have a textured finish?
- 24 Why are the corners slightly rounded? .
- 25 (Space for optional product enclosure question.)

INPUT INTERFACE

- 26 Why are the door hinges in full view and not hidden away?
- 27 What is the purpose of the metal trim around the door?
- 28 What is the purpose of the grey edging strip along the inside of the door?
- 29 Why is it a grey colour and not white to match the rest of the interior?
- 30 What is the purpose of the black edging along the inside of the door?
- 31 What is the reason for having three and not just one door catch?
- 32 Why is the interior coloured white?
- 33 Why is the interior space this particular size, and not either larger or smaller?
- 34 What is the purpose of the series of holes in the right hand panel?
- 35 Why are the inside corners not rounded, as in most conventional ovens?
- 36 Why are there no shelves in the interior, as in conventional ovens?
- 37 (Spare question for input interface.)

OUTPUT INTERFACE

As input interface.

PRODUCT MATERIALS

- 38 What material is the power knob made out of, and why is it made out of this?

- 39 What material is the door panel made out of, and why is it made out of this?
- 40 What material is the off-white case made out of, and why?
- 41 What material is the base of the interior made of, and why?
- 42 What materials are the walls of the interior made of, and why?
- 43 What material is the roof of the interior made of, and why?
- 44 (Spare question space for product materials.)

GENERAL PRODUCT

- 45 Do you think that the oven is light or heavy to lift - why is it so light/heavy?
- 46 Why does the oven make a noise whilst cooking?
- 47 Why is the oven wall so thick?

SUPPORT QUESTIONS

- 1 Length of period of use.
- 2 Do you have any special connection with the microwave industry?

PRE-PURCHASE AND PURCHASE

- 3 Why were you originally attracted to the idea of microwave ovens?
- 4 What attracted you to the Creda, as opposed to other makes or models?
- 5 What was the most important of the Creda features?
- 6 Before you bought the oven, in what ways did you try to find out information, eg books, sales leaflets, demonstrations, friends, etc?
- 7 I would like you to tell me which of the following you consider to be most important in deciding to buy the oven:
- (i) LISTENING to what friends or salesmen said about the oven.
 - (ii) READING about the oven in books, magazines, instructions.

(iii) LOOKING at the oven in shops or pictured in magazines.

Which was the least important?

8 Compared with other products that you may have bought, like furniture, electrical goods, cars, etc, would you say that choosing a microwave oven was easier or more difficult? Why do you say that?

9 (Question space for purchase question.)

LEARNING TO USE THE PRODUCT

10 When you first bought the product, would you say that:

- (i) you read all of the instructions before using it;
- (ii) you read a few of the instructions before using it;
- (iii) you read none of the instructions before using it?

11 Everybody makes mistakes when they first use a microwave oven. What kind of difficulties did you have when you first learned to use it?

12 Is there anything that can be done to the product that would make it easier to learn to use - like more instructions on the product itself or different types of controls?

PRODUCT IDENTITY/STYLE

13 The style of a motor car can be described using a variety of words, eg sporty, sleek, compact, luxurious, etc. What words would you use to describe the style of the oven?

14 I would like you to look at these photographs of other microwave ovens. Is there one that you prefer the look of, rather than the Creda? Why do you prefer it? (If the answer is no, ask about a particular feature.)

15 How would you improve the way the Creda looks?

16 What is the most ugly feature of the oven?

17 Would you say that the oven is generally:

- (i) ugly,
- (ii) good looking,
- (iii) of average looks?

18 Is there any aspect of the way the product looks that you feel does not fit in with your kitchen decor or other appliances?

- 19 In general, does its style fit in:
(i) very well,
(ii) moderately well,
(iii) not well?
- 20 Do any of the features have a low quality finish or standard of workmanship?
- 21 Would you say that the quality of finish or standard of workmanship of the oven is:
(i) high quality,
(ii) of average quality,
(iii) poor quality?
- 22 Which parts of the oven are the most difficult to clean?
- 23 Would you say that in general the oven is:
(i) quick and easy to clean,
(ii) difficult and time-consuming to clean,
(iii) average?
- 24 Which visible parts of the oven would you expect to show wear and tear first?
- 25 Is the product generally:
(i) robust and durable,
(ii) of average durability,
(iii) not particularly durable?
- 26 What aspect of the oven would you consider to be least safe?
- 27 In general would you say that the oven is:
(i) very safe,
(ii) moderately safe,
(iii) unsafe?
- 28 Which of the following features would you wish to have incorporated in the oven if the extra cost was small? (I shall read out the list, then repeat it slowly so that you can indicate yes or no to each feature.)
- (i) The oven automatically detects any spillage of liquid or food and switches itself off, eg boiling over is prevented.
 - (ii) The oven cannot be switched on when empty.
 - (iii) The oven cannot be switched on with metal objects inside it.
 - (iv) The oven is self-cleaning.

- (v) The oven has a built-in thermometer that can be inserted into food.
 - (vi) The oven can be programmed so that the power cycle can change automatically, eg when defrosting the setting can go from low power to high without resetting.
 - (vii) A turntable is included to rotate the food automatically.
 - (viii) The oven gives a warning if any microwave leakage occurs.
 - (ix) The oven can be set to stir liquids whilst cooking.
-

Name:

Address:

Age group: 15-20 20-25 25-30 30-35 35-40 40-45
45-50 Over 50

Occupation or self-description:

Socio-economic group:

Product serial no:

NOTES: self-image question

6.5 THE INDIVIDUAL FUNCTION OF THE QUESTIONS

An analysis of each question, 1 - 47.

6.5.1 THE USER QUESTIONS

CONTROL INTERFACE

Q 1 What is the red light for?

This question is thought to be one of the easiest to answer and so was deliberately introduced at the start of this section to familiarise the interviewee with the form that the subsequent questions would take, without being over-demanding in other directions. In point of fact it is likely to provoke a very similar response in many users - ie to tell them that the oven is on.

Q 2 Why is it red rather than any other colour?

As the colour can vary depending on whether it is operating (orange), or according to whether the ambient lighting is strong or weak, the question was put in the form "Why is it this colour, rather than any other colour?" The general intention was to find out how closely the designer's symbolic use of the colour matched the user's interpretation of it.

Q3 Why is it rectangular and not round, for example?

The question is put in the form "Why is it rectangular . . . (pause) then, and not like these?", indicating the circular switches and scales. Again it is a fairly straightforward comparison question between the design intention and the user's perception. Some indication of whether users place any meaning, other than the purely decorative, on this flat, graphic shape may well be significant, given the broad probable safety role of the light.

Q 4 Why is the power knob smaller than the time knob?

The question is posed in this form, but is prefaced by the comment "You have probably not noticed, but . . .", the purpose of which is to prevent the user from automatically assuming that his or her perception is inadequate and thus preventing a balanced approach to the problem. In earlier pilot questioning the word "switch" was used instead of "knob", but it was observed that a number of interviewees thought that this referred to the switch and surrounding scale combined.

This question is perhaps one of the more difficult to answer, so a consequent reliance on the prompt card answer is probable. At the time of the user interviews, like many other questions, the meaning of this characteristic was unknown to the interviewer - a situation which is possibly helpful, as it minimises the possibility of unconsciously leading the interviewee.

Q5 Why does it have a metallic finish?

It is recognised that two of the words in the question - metallic and finish - are, in a sense, leading statements about the nature of the product materials. However, less meaningful alternatives are difficult to imagine. It is believed that the word "finish" in common usage does not imply a surface coating or a surface treatment of a solid material - but could be either. Also the word "metallic", as it is commonly used, does not necessarily imply an actual metal finish but can be equally interpreted to mean a 'metal-like' appearance. (O E D: METALLIC - of metal(s) . . . characteristic of metals, as metal lustre.)

It is thought that the substitution of a less specific question, ie "Why do the control knobs have the finish that they do?", would be rather too ambiguous, in that it could be concerned with the high gloss, the reflected colour, the scratch marks, degree of precision or composition of the switch.

Q 6 Why does the power scale only extend around part of the circle?

This question is posed as it is written, the gap segment of the circle being indicated by pointing. Again it is a rather difficult question to answer and reference to the prompt cards is likely. In terms of results, the divisions are likely to be between operational advantages and technical reasons. Some reference in the pilot questionnaire results was made to other appliances which possess this characteristic.

Q 7 Why does it have a part-orange, part-yellow circle around it?

Again this is posed as written. It has a design relationship to Questions 1 and 10, in that these also refer to what is likely to be an inconsistent design colour code, the power light being orange/red, the power scale being orange and yellow and the timer having an orange circle around it. If, as seems likely, the orange and yellow segments on the power scale symbolise high and low cooking temperatures respectively, then the use of the colour orange on the time scale has no obvious relationship and could, if purely decorative, be misleading. To a lesser degree, the on/off warning light colour may only add to this confusion. An extra question for the design team is therefore justified. It is concerned with the relationship of these colours and whether there was an attempt to design a colour co-ordinated symbol system or not.

Q 8 Why is the time switch above and not below the power switch?

The question is posed as written. Occasionally, after a pause, the probe "and not the other way round" is added. It is probable that the design intentions for this

characteristic are likely to be in the manufacturing and technological spheres. During the pilot questioning it was noted that there was a general reluctance to define manufacturing advantage as a motive, probably because it would imply criticism of the product. (The concept of an elegant and economic production process is probably only seen as praiseworthy by those connected with product design and manufacture. To the consumer, cost-cutting on the part of the manufacturer is, understandably, likely to be associated with a feeling of being taken advantage of. With an expensive product, the acceptance of such an attitude gets dangerously near to self-criticism for having purchased the 'dubious' article.) Where the design intention was within this manufacture/technology definition, then this and other similar question results were examined for evidence of this type of user attitude.

Q 9 Why does the minute scale get larger, the nearer it gets to zero?

The question is posed as written and always followed by indicating the way in which 5 minutes takes up a larger segment of the circle at the 30 minute end of the scale than it does towards the zero end. This is because many of the interviewees in the pilot examination were not consciously aware of this characteristic and it consequently required added explanation.

The question of conscious and subconscious awareness of a design characteristic, particularly when, as in this case, it is connected with an ergonomic advantage, is an important one. It could well be argued that it is irrelevant that the user recognises that the time scale increases, when it is perhaps inevitable that he or she will be able to operate the timer more easily and more accurately, whatever the level of comprehension.

Q 10 Why does it have an orange circle around it?

(See Question 7.)

This question checks for any confusion connected with the decoration/colour coding of the two switches and warning light - an even scatter of different user responses from the designer response will provide such an indication.

Q 11 Why does it go up to 30 minutes and not a greater or lesser time?

In a sense this question is almost certain to produce an answer which lies within the category devoted to ease of operation of the product, ie "most of my cooking falls within this time limit". What may be more relevant to this research is the information which may accompany such a reply. Statements about the user's ready acceptance of this time limit, even though it may differ from the personal

limit of time when in actual use, are of particular note, since they provide warning of a lack of critical awareness.

Q 12 Why is the oven door release mounted on the control panel and not on the door?

The question is stated as above, but it is important that the actual device is pointed out to the user, since "oven door release" may not be understood. (Substitute words like "door handle" may be even more confusing, because of the device doubling as both door opener and power control switch.) The question has a variety of possible answers, many of equal plausibility. It may thus provide a useful indication of the user's ability to interpret concepts of ergonomic, engineering mechanics, material stress and strain, and construction detail. The central point of interest is the way that the user discriminates between explanations which are self-beneficial and those which benefit the manufacturer. This, in turn, provides more general data about the user's overall critical or non-critical attitude to the oven.

Q 13 Why is the door release this particular shape?

Very occasionally, if the user response is hesitant, the words "rectangular, a long strip . . . not a lever" are added.

The undistinguished form that the release switch takes is again useful, in that its anonymity allows a wide range of potential reasons to be put forward. If it had been shaped like a conventional door handle, ie a U shape, then, in all probability, the user's reply would fall automatically into the category of operational benefit. If, in spite of its ambiguous form, the user response remains centred around ergonomic benefits, ignoring possible manufacturing advantage, then again a consistent bias of attitude in favour of the product may be indicated.

Q 14 Why does it (the door release) have a textured finish?

The textured surface must be pointed out and, during the pilot interviews, many users touched the release, presumably to check that it was, in fact, slightly textured.

The question can be answered on a simple level, in terms of ergonomic benefit, ie "wet or greasy fingers will not slip", or in terms of applied decoration. On a more difficult level, the possibility of manufacturing advantage would seem to indicate a user with a high degree of technical knowledge or intuition (even if the response proved to be incorrect in design terms).

Q 15 Why does the door have a fine mesh across it?

The question is asked in the form "I don't know if you have noticed when the internal light is on (the light is switched on) that there is a fine metal mesh across the door viewing panel - do you know what its purpose is?"

The question is the first which refers directly to a characteristic which has a purely technological role to fulfil. Indeed, it is fairly obvious that its presence is an operational drawback, since it makes it more difficult to view the interior. It is expected therefore that the majority of users will define some kind of technological justification for its existence. The form that this explanation takes is of great interest, because a possible safety hazard may be indicated. For example, the function of the mesh is to prevent the emergence of microwaves and yet allow the passage of visible light. During the pilot interviews some users believed it to be a device for preventing the heating up and eventual cracking of the transparent door panel. Under such circumstances, it is possible that any damage to the mesh might be tolerated by the user, with dangerous consequences.

On another level, the function of the mesh is mentioned in the instruction booklet, but only obliquely, on the diagrammatic representation where the viewing panel in the door is arrowed and referred to as "oven door - including glass panel and screen". What the "screen" does is not mentioned. The user response to the question may well be conditioned by this reference, although its inconspicuous nature does not provide any indication of how well the instructions were read or understood.

Q 16 Why does the door have a thick dark band around it?

It is important that the band is pointed out clearly as, verbally, it might be confused with the seals or door rim. The door has to be open and the interior light switched on for best results.

There is a danger in following the previous question with this one that some pre-conditioning might occur in relation to the function of the mesh. However, the proximity of the band and its obvious close relationship (visually, at least) with the mesh would appear to pre-empt such conditioning. This question is a potential indicator of the ability of the user to comprehend the differences between technological detail and pure decoration, in that it appears to be strongly linked to the screen and might be thought to reduce the area of visibility through the door. Hence the information presented more than hints at a technological function, when the likely purpose is to render the front inside edge (including seal) of the oven invisible when the door is closed.

Q 17 Why is the control panel this colour?

The question is asked in the form "Why is the control panel this particular colour - dark brown in two tones, unlike, for example, the outer case?"

The general intention of the question is to find out what "purpose" the user may ascribe to a colour, given the range of options on the prompt card. It is not a test of what associations the colour may hold - although this may well be revealed by some interviewees. It is possible that users may interpret this "purpose" in the same way that the dark band around the door is, ie it has a non-decorative "purpose".

Q 18 What is the thin line around the panel for?

The question is asked as stated but it is important that the line is indicated, to distinguish it from the trim.

The line is clearly a printed, two-dimensional image and as such may not be thought to have any particular function, in the way that a three-dimensional trim might. It is likely therefore that the user will either see it as a purely decorative feature or one which makes the controls visually more easy to use (or both).

Q 19 Why is the control panel at the side of the door and not above or below it?

The question is asked in the above form. Its purpose is to find out how the user feels about the general control positioning - is there an assumption that the controls are thus placed for his or her benefit? Or is there an accompanying recognition that manufacturing or technological parameters play an influential role?

Also, although microwave ovens are fairly new to the mass market in Britain, it is possible that the "traditional" form that the product might take is already well established. In the "Which Magazine" guide to microwave ovens (November 1979) for example, 14 ovens are tested and only one model, the Philips 610D, deviates from the arrangement of control panel down the right hand side, opening door pivoting from the left. Even this model has now been deleted in favour of the Cooktronic 7915, which conforms to the standard arrangement. Thus an already established view of the Creda control panel position, that it is a traditional and hence tried and tested arrangement, may be present in the user response.

Q 20 Why is there a gap between the door and the control panel?

This question is asked in the form: "I don't know if you have noticed, but there is a gap between the door and the

control panel (indicated) which is about a quarter of an inch wide - have you any idea why this prominent gap should be necessary?"

The question potentially possesses several different solutions, from manufacturing tolerances, ergonomic constraints to aesthetic detailing. Thus the general view of the interview group may indicate a bias towards one set of these solutions, which may, in turn, reflect a particular sensibility towards the reasons why product characteristics exist as they do.

Q 21 (Space for extra control interface question)

These spaces are included at the end of each section in case a particular characteristic of the product which was previously thought to be unimportant assumes some significance during the early interviews, in which case an additional question may be inserted.

Page 2

PRODUCT ENCLOSURE

Q 22 Why was (off-white) chosen for the product enclosure?

The question is asked in the form "Why was this colour (indicated) chosen for the outer case?" This is because a variety of verbal descriptions of the colour was recorded during the pilot interviews and it is felt that a stated colour would therefore tend to prejudice the interviewee's response.

The question is an important one, in the sense that it deals with one of the fundamental aspects of kitchen appliance design, ie the product identity of so-called "white goods" and its relationship to the colour white, with the resulting associations of hygiene and cleanliness. Responses in the form of "clean-looking" or even "looks like other kitchen appliances" would tend to confirm the acceptance of this traditional identity, in spite of the fairly revolutionary nature of the product's technology.

Q 23 Why does it have a textured finish?

The question is asked in this form.

In contrast to the previous question, the textured finish departs from the smooth, glossy finish of many other appliances: washing machines, cookers, dryers, mixers, etc, whilst the colour remains in context. This might be viewed as an attempt to improve the aesthetic appeal of the product or simply a means of finishing the product more cheaply. The former view would seem to imply an agreement that the texture does improve the visual quality, whilst the latter probably indicates a degree of criticism on the part of the user.

Q 24 Why are the corners slightly rounded?

The question is asked as stated. It refers to the external corners on the steel case only.

It is a common view within the design field that the radii of corners can represent a somewhat unwarranted obsession with detail, to the exclusion of more important product characteristics. There may be recognition that adjustments in proportion are done for purely "unwarranted" aesthetic reasons, or the user may define a more "practical" justification.

Q 25 (Space for optional product enclosure question)

INPUT INTERFACE

Q 26 Why are the door hinges in full view and not hidden away?

The question is asked thus: "I would like you to look at the hinges. On some models they are built into the oven and cannot be seen from the outside. Why do you think that they are exposed on this model?"

It is therefore a question which distinguishes between an exposed, mechanical detail, the type of detail that has been internalised, or, in the case of the purely electrical or electronic product, deleted. The importance of this type of detail was emphasised by Ziziros⁽¹⁾ in an article in Design Magazine, when discussing the relevance of user research to the design of gramophone turntables:

"First we confirmed what we suspected, that cosmetics are more important than features and possibly even performance. Since we are, I suppose, in an extension of the toy business - we make toys for adults - this is not surprising; but it is important to design thinking. Second, our cosmetic emphasis on wood was wrong, so we reduced it. And an item that we thought was trivial - the hinging of the lid - was most vital to people's perceptions of the product. With hindsight we realised that a hinge is what people first come across in the product as a working unit; it will have a bad effect if it is badly done."

In many respects the door of the microwave oven is similar in status to the above-mentioned lid of the record deck. It is one of the features that users actually try out, even if the product is not functioning electrically in appliance sales outlets. It may also involve the perception of safety factors related to the microwave door seal.

The question is designed to provide information about the associations connected with the hinge, whether decorative,

structural, safe or cheap to manufacture, and hence adds to the evidence about the overall product identity.

Q 27 What is the purpose of the metal trim around the door?

The question is asked in this form, although it is important to indicate that the metal trim is not just the exposed metallic edge but includes the dark grey covered part, in fact the entire area around the viewing panel.

Structurally this component acts as a rigid frame for the door and also enables it to be hinged to the body of the oven, providing a base for the door interlocks. Nevertheless it may possess connotations of the rather more superficially applied decorative trim associated with, for example, car windows and appliance design of the 1940's and 50's.

Q 28 What is the purpose of the grey edging strip along the inside of the door?

The question refers to a semi-translucent strip, approximately half an inch wide, which surrounds the oven interior on the body of the oven. Since devising the original question it has become evident that the word 'grey' should be deleted, since it is not the pigment colour of the material and may be misleading.

As in the case of Question 15, the user's identification of the safety feature is perhaps critical in certain extreme situations, ie in order to "ensure that the oven door seal and front rim of the oven are kept clean and free from soil",⁽²⁾ the user must be able to identify the seal. To aid this, the diagram of the oven⁽³⁾ indicates the seal clearly, and thus any misconceptions expressed by the user may result from a combination of unread or unremembered instructions and a lack of symbolic or realistic design indication that the strip is, in fact, a seal. Failure to recognise it as such may lead to soiling being left deposited on it and may result in microwave leakage. The possibility is further compounded by the existence of an additional plastic seal on the inside edge of the door, which is not indicated on the diagram.

Q 29 Why is it a (grey) colour and not white to match the rest of the interior?

Again the word 'grey' is deleted and, in this case, the word 'neutral' is substituted. The contrast with the interior colour is included to create the idea in the user's mind that a positive deviation away from the norm has been carried out, for which there must be a justifiable and, by implication, answerable reason.

If the seal is identified by the user, a simple answer

might be that it has to be made of this material, which must be this colour, for technical reasons. Conversely it is a different colour from its surroundings so that it can be identified easily. Any response which differs indicates a lack of recognition of its role as a microwave seal.

Q 30 What is the purpose of the black edging strip along the inside of the door?

The question is asked in the above form and the strip clearly indicated to the interviewee.

The question is similar to the previous one, in that it concerns the user's understanding of the microwave seal. However, as was stated previously, the apparent existence of two sets of door seals may be confusing, particularly as they are visually dissimilar. Also the user is faced with an apparent paradox, in the sense that the instruction booklet⁽⁴⁾ explains that microwaves are not reflected by plastics, in which case the fact that the seals are made of plastic may appear confusing.

Q 31 What is the reason for having three, and not just one, door catch?

The question is asked in this form.

Again the question is concerned with aspects of safety directly related to the innovatory product technology and its interface with product operation.

Q 32 Why is the interior coloured white?

The question is asked in the form "Your conventional oven probably has an interior which is a dark colour, perhaps black or dark grey. Why do you think that the microwave oven interior is a light colour?" As in Question 29, the purpose of contrasting the two colours is to encourage the idea that a justifiable deviation from the norm must be explained. The reference to a definite colour (white) has been removed, for reasons previously stated.

The question is a fundamental concern of the industrial designer and possibly the ergonomist - like many of the other questions, the user with little or no training in design is being asked a question which requires a design analysis, albeit a simple one, for its solution. The perception of colour may relate to decorative qualities or beneficial operational qualities in the way of increased visibility into the interior.

Q 33 Why is the interior space this particular size, and not either larger or smaller?

The question is asked in this form.

Although the question is on a specific point of detail, the range of possible answers makes it a fairly open-ended question, related to the volume of food cooked by the user and perhaps some possible speculation on the size dictated by the product technology itself.

Q 34 What is the purpose of the series of holes in the right hand panel?

The series of holes is normally not within the line of vision of the standing user, so it is necessary to point them out clearly, particularly as there are other holes elsewhere in the interior.

The holes are an external clue to a totally internalised technical process. Hence the user's response indicates a part of his or her understanding of the product's internal functioning.

Q 35 Why are the inside corners not rounded, as in most conventional ovens?

The question is put in the above form - occasionally, if the user hesitates, the inside corners are indicated and the words "as you can see, these corners are very square" may be added.

During the pilot interviews a small number of interviewees responded to the effect that the square corners were easier to clean than rounded ones. This can be assumed to be a demonstration of the lack of ability or desire to criticise the product and is a useful guide to the other responses of such users, which should be treated with caution. (The alternative responses fall into ease of manufacture and technical constraints related to the properties of microwaves.)

Q 36 Why are there no shelves in the interior, as in conventional ovens?

Since piloting the question, the singular form of 'shelves' has been substituted, in order to reduce the possibility of answers which relate to the smaller interior space of the microwave oven.

The character of the question is unlike the previous questions, in that it concerns the lack of a particular characteristic rather than its existence. It is included because it provides an open-ended formula for the user to consider the nature and properties of microwaves - independent of physical features. It is likely that the product designers will have contemplated it as a possibility and thus a correlation between the two sets of interviews is still possible.

OUTPUT INTERFACE

In the case of the microwave oven, the common input/output interfaces are the same, ie the oven door and interior; the energy input is obviously not, but this is considered to be of relatively little importance compared with the other product characteristics.

PRODUCT MATERIALS

The purpose of the questions in this section is to examine the way that users perceive materials and, in a similar way to the previous questions, examine the user's understanding of why these materials were employed in the product. A statement of this purpose is given to the user to prepare him for what is one of the more difficult sections of the questionnaire to answer.

Q 38 What material is the power knob made out of, and why is it made out of this?

The question is asked in the above form.

It deals with a material which is overlaid with an entirely different material, possibly for decorative reasons. This question is intended to probe the user's perception - is the covering layer taken at face value or is the true nature of the material understood? What does the user make of the "deception" itself?

Q 39 What material is the door panel made out of, and why is it made out of this?

The question is asked as stated.

Clearly the range of options for the material composition is limited to either glass or plastic, or a combination of the two. Two clues as to the identity of the material are contained in the instruction manual;⁽⁴⁾ on page 8 under Cleaning and Maintenance, point 2 states "Use only a mild detergent, water and a soft cloth to clean the door surface and interior surfaces". In other words, the door can be damaged by abrasive cleaners and is thus more likely to be the softer of the two materials, a plastic. Secondly, on page 9⁽⁴⁾ under Questions and Answers the question "The inside door of my microwave oven seems to ripple when I cook; is it safe to use?" is asked, to which the reply reads "Yes, it is safe to use. It is only expanding because of heated air or steam and will return to normal when cool." This effect is not normally noted on other appliances, such as conventional cookers with glass doors, and so the user may have deduced that the door cannot be glass.

The problems associated with the confusion of materials with differing properties has been discussed previously (ref 1.1), with reference to the dangers of using an

abrasive cleaner accidentally. Like the example of the acrylic bath, the transparent door has several associations which may confuse the user. It is an oven door viewing panel in a tinted, transparent material and thus may be compared with the glass doors fitted to conventional cookers.

Q 40 What material is the off-white case made out of, and why?

The question is asked in the above form, but with the words "off-white" removed (see Question 22).

As in Question 38, this question is concerned with a material which has a surface layer of a different material covering it. The perception of this "illusion" by the user is investigated, together with his opinion as to why it has been done. There may be an association of manufacturing cost reduction, or the finish may be viewed as an acceptable form of decoration.

Q 41 What material is the base of the interior of the oven made out of, and why?

The question is asked in this form.

The question is an extremely difficult one, as this material is probably quite a complex one, not frequently encountered by the user. There is no reference to what it is in the instruction manual, but the sales literature does state that "The base of the oven itself is sealed pyro-ceramic, so food can be cooked directly on it", and some of the users may have read this. The fact that the material is a pure white colour, as opposed to the walls of the oven cavity which are a pale cream colour, may emphasise the difference in materials, as may the fact that the material appears thicker than reality because of its disguised front edge.

Q 42 What materials are the walls of the oven made of, and why?

The question requires some clarification so that the interviewee does not include the roof of the oven cavity. It is asked in the form "What materials are these three internal walls (indicated) made of . . . and why?"

The instruction manual⁽⁴⁾ clearly states on page 1 that "Metal reflects microwaves. The walls and top of the oven are made of metal so that the microwaves will bounce off them into food placed in the oven."

The user response is clearly, therefore, conditioned by having either read or remembered this statement. The response is seen as an important indicator of the degree of accuracy of user perception of materials technology.

Q 43 What material is the roof of the interior made of, and why?

The question is asked in this form and is essentially similar to the previous one.

Q 44 (Spare question for product materials)

Page 3

GENERAL PRODUCT

This short section is designed to include certain characteristics which are centred on important, non-visual, perceivable characteristics - weight, smell, touch, noise, etc - together with any questions which may not slot easily into a single product interface category.

Q 45 Do you think that the oven is light or heavy to lift? Why is it light/heavy?

The question is asked in this form.

During the pilot questionnaire a number of users said that they found the oven rather heavy to install and move. As the weight of the oven is due to its internal technological components, rather than for reasons of stability, ergonomic improvements, etc, the question is seen as a means of gathering more information about the user attitude to the internal technology.

Q 46 Why does the oven make a noise whilst cooking?

The question has been slightly modified, so that it now reads "Why does the oven make a noise whilst operating", to avoid implying that the noise is related to the physical 'cooking' of the food.

As in the previous question, the user's perception of the technological process is examined. The noise can be related to the air and condensation extraction process or to the generation of microwaves.

The characteristic represents an important difference between the microwave oven and more traditional forms of cooking, and one which is possibly overlooked during the purchase demonstration, which may take place in noisier surroundings than the domestic kitchen.

Q 47 Why is the oven wall so thick?

The question is asked as stated.

The purpose is to add to the information about the user's background knowledge of the properties of microwave radiation.

SUPPORT QUESTION FUNCTIONS

Q 1 Length of period of use

As the printout of user addresses contains a numerical code which gives the date of purchase, the information as obtained from the user is not really necessary. However the question is included at the insistence of Creda. The information is required to validate the one to two year period of use required as part of the t i p selection criteria.

Q 2 Do you have any special connection with the microwave oven industry?

As with the previous question, this is a test for validity. The difference between an acceptable and an unacceptable reply is a question of degree. At one extreme, a user who was involved with the design of microwave ovens would obviously give unrepresentative replies; on the other hand, a person carrying out routine clerical work within the industry could usually be considered to be fairly acceptable.

The selection of the South Yorkshire area for this research is likely to minimise this possibility, in that there are no known manufacturers of domestic appliances in the region and certainly no organisation that is concerned with the design and production of microwave ovens.

Pre-purchase and Purchase

Q 3 Why were you originally attracted to the idea of microwave ovens?

This question is put in the form of "Why were you originally attracted to the idea of microwave cooking?" The reason is that the interviewee is less likely to be diverted into commenting on the actual oven purchased, which is the concern of Question 4, and more likely to concentrate on general qualities of the cooking method.

The purpose of the question is to provide information about general expectations before purchase, which can then be compared with other data which deal with the fulfilment of expectations.

It also provides more information about perceived identity, as it can provide responses which deal with fundamental needs and requirements (for speed, for defrosting, for convenience, etc) rather than provoking more superficial responses describing the product's physical function, ie cooking food.

Q 4 What attracted you to the Creda, as opposed to other makes or models?

The question is asked as above.

Again it is concerned with identifying fundamental aspects of perceived identity. On another level, it may indicate the relative importance of product identity compared with other influential factors, such as price, availability, servicing guarantees, special sales offers, credit facilities, etc.

Q 5 What was the most important of the Creda features?

The question is asked as above.

It is inserted in the questionnaire on behalf of Creda and would not otherwise be included. The pilot questionnaires show that the long-term users interviewed were seldom able to recall more than a couple of reasons for preferring the Creda before they purchased it and frequently only one.

Q 6 Before you bought the oven, in what ways did you try to find out information, eg books, sales leaflets, demonstrations, consulting other users that you may have known, etc?

The question is asked in the above form, but rather than being a strictly controlled check-list of possible information sources, examples are given and the user left to open-endedly discuss information sources. The exception is the influence of other known users, which is understood to be influential when the product is innovative.⁽⁵⁾ This was then questioned separately: "Did any of your friends possess a microwave oven . . . and did they discuss it with you?"

Allowing an open-ended approach, this question means that the user will probably indicate the most important influences rather than producing a catalogue of all possible influences, which would be the case if a check-list method had been employed.

Q 7 I would like you to tell me which of the following you consider to be most important in influencing you to buy the oven: (i) LISTENING to what friends or salesmen said about the oven; (ii) READING about the oven in books and magazines; (iii) LOOKING at the oven in shops or pictured in magazines. Which was the least important?

The question is asked in the above form, with the exception of the final line. It was found in earlier tests that "What was the second most important?" was more easily answered than "Which was least important?" - though

obviously the information obtained is essentially the same.

The purpose of this line of questioning is not to determine the primary sources of purchase influence, but to determine the type of sensory experience which has greatest effect. This is of prime importance because it will help to determine the relative status of visible perception (iii), as opposed to information gathering (ii), or susceptibility to outside influences (i). Whilst it is accepted that these categories are perhaps highly simplified, the results, when contrasted with the related design expectations, allow the research conclusions to include a view of the user's priority compared with a view of the designer's view of his own professional influence on the product and its user.

Q 8 Compared with other products that you may have bought, like furniture, electrical goods, cars, etc, would you say that choosing a microwave oven was easier or more difficult? Why do you say that?

The question is put in the above form, but some attempt is made to link the consumer durables that are quoted as examples of the kind of products that are observed in the interviewee's home. Occasionally, if the user has difficulty responding to this question, a probe question is used: "Did you find it more difficult to select the product from the others available . . . was it more easy or more difficult to make up your mind?"

The results of the question are used to confirm or refute the theory that microwave ovens, because of their innovatory nature, are difficult for users to evaluate in terms of their potential usefulness. The evidence is unlikely to be conclusive as one particular factor - the number of products that the user makes his selection from - will affect attitude. This may have little or no connection with the number of ovens actually on the market at the time of purchase, but may be more closely linked with the proportion of those products actually encountered by the user.

Also, the nature of the marketing policy of the microwave industry must play a part in influencing the results - as was shown in the limited pilot questionnaires, the role of product demonstrations is highly influential and may well be viewed by the user as a means of easing the decision-making process.

In discussing any results from this question, it is important that such factors are taken into account.

Q 9 (Question space for purchase question)

Learning to Use the Product

Q 10 When you first bought the product, would you say that (i) you read all the instructions before using it; (ii) you read a few of the instructions before using it; (iii) you read none of the instructions before using it?

In the pilot interviews this question (like others which were subsequently altered) produced a fairly predictable response, in which nearly all the interviewees replied that they had read all the instructions prior to operating the product. It was, however, considered that even this rather suspect response pattern did indicate a specific and genuine attitude to the importance of instruction reading. If it remains consistent in the questionnaire application, it must be contrasted with previous questions, which include information about facts stated in the instruction manual, eg Questions 42 and 43 in the first part of the questionnaire.

Q 11 Everybody makes mistakes when they first use a microwave oven. What kind of difficulties did you have when you first learned to use it?

The question is put in the form as above, but the words "including me" are inserted after 'mistakes'. This is to encourage the interviewee to feel that admitting to mistakes is not a critical self-judgement.

The main difficulty with this question is directing it at the product learning process and not at the more general mistakes that might have been made in carrying out the food preparation. If the results are found to be biased towards the latter, the only conclusion that can be drawn is that the learning process for the product use and control was fairly simple, compared with the learning process applied to the production of a reasonably high standard of food preparation.

Q 12 Is there anything that can be done to the product that would make it easier to learn to use? . . .
(Probe) like more instructions on the product itself or different types of controls?

The question is asked in the above form.

This question type has generally been avoided throughout the rest of the questionnaire, since it is asking the user to perform the role of designer. However, the real purpose of the question is not to gather new learning methods, even if this were possible. It is designed to provoke the user to respond in a way which is critical of the methods of learning that he/she has been involved in.

Product Identity/Style

- Q 13 The style of a motor car can be described using a variety of words, eg sporty, sleek, compact, luxurious, etc. What words could you use to describe the style of the oven?

The question is asked in this form. The word "compact" has, however, been dropped from the list of examples, since it might readily describe the microwave oven and hence tend to lead the interviewee in that direction.

The purpose of the question is to allow the user to describe the overall identity of the product in a fairly open-ended form. During the pilot interviewing this particular question proved to be one of the most difficult for users to respond to and the assumption was that the question form itself was at fault. However, in later comparison tests between the appearance of the Creda and two other models, the results showed that the Creda user preferred the "simplicity" of the product. It may be therefore that the question itself is not inherently difficult to answer, but the perceived "neutrality" of the product itself is difficult to put into words. The results are therefore examined for a particular bias towards words which describe a neutral, simple, plain or ordinary image.

- Q 14 I would like you to look at these photographs of other microwave ovens . . . (20 second pause approximately) . . . Is there one that you prefer the look of, rather than the Creda? . . . Why do you prefer it? (If the reply is no . . . Why do you dislike the other two products?)

The question is asked in the above form. The selection of other products has been deliberately kept to a minimum, ie two samples: a colour photograph of the Philips "Cooktronic 7915" labelled 'A' and the Toshiba ER-778 labelled 'B'.⁽⁶⁾ The two images were selected on the basis that they represent a number of design extremes. The Toshiba is an early model, at least three years old, with a digital time read-out, temperature setting, 'heat and hold' control, complicated control panel, prominent door handle and imitation wood-grain finish. In general it has a slightly old-fashioned air. The Philips model has a visually simple, yet functionally complex, control panel, an information panel for various food cooking times, an unobtrusive door handle and a slightly futuristic style which departs quite radically from the traditional white goods identity, and would appear to have more in common with the Philips house style as applied to some of their hi-fi and video equipment. Both products have a more complex appearance than the Creda.

Like the previous question, the intention is to enable the user to indirectly describe his/her attitude to the

visual identity of the Creda - this time by contrasting it with other possibilities. If, therefore, any comment is made which refers to either of the examples it is always contrasted with the Creda.

Q 15 How would you improve the way the Creda looks?

The question is asked as above.

As in the case of Question 12, the user is being asked to make design decisions which he may find difficult, particularly given the fairly anonymous appearance of the product. Certainly the tendency during the pilot interviews was to reply that the Creda was already attractive enough as it was. However, this tendency is felt to be a positive finding, since it would tend to show where the limitations of product research lie, particularly when contrasted with the following question - which is a further probe to this one.

Q 16 What is the most ugly feature of the Creda oven?

The question is asked in this form.

The intention is to put the user into a position where any response must be critical. The immediate reaction during the pilot interviews was to state that there were no ugly features - in which case it was found necessary to run through different areas of the product appearance until the user responded. The question serves the dual purpose of creating a critical attitude before making the overall assessment of the quality of appearance in Question 17. This will tend to correct the tendency to over-praise the product found during the pilot. The technique is employed in Questions 16 to 27.

Q 17 Would you say that generally the oven is (i) ugly, (ii) good looking, (iii) of average looks?

The question is asked in the above form.

It is not really anticipated that the user will describe the product as being ugly, since he did decide to purchase it. However, compromises may have been made to justify the purchase of a product of average appearance. Alternatively the actual selection of products did not include one which the user felt was attractive.

Q 18 Is there any aspect of the way the product looks that you feel does not fit in with your kitchen decor or other appliances?

The question is asked in the above form.

Again the question is intended to increase the critical approach of the user prior to making a general judgement

in the question that follows. The relationship of the product's identity with other products and with the working environment is under scrutiny. The apparent anonymity of the object is likely to provoke few critical responses.

Q 19 In general, does the style fit in (i) very well, (ii) moderately well, (iii) not well?

The question is asked in the above form.

Q 20 Do any of the features have a low quality finish or standard of workmanship?

The question is asked in the above form. If there is no response the statement "Is there something that you feel is not particularly well made?" is added.

In the pilot interviews reactions to this were fairly variable. Some users expressed the opinion that most mass-produced articles had a low standard of finish and therefore tended to judge the Creda relative to this low standard. Others tended to judge it according to a more general quality standard.

Q 21 Would you say that the quality of finish or standard of workmanship of the oven is (i) high quality, (ii) of average quality, (iii) poor quality?

The question is put as stated.

As in the case of Question 19, a simple method of obtaining a value judgement is employed, to simplify comparisons with the design interview results.

Q 22 Which parts of the oven are the most difficult to clean?

The question is asked in the above form.

Few would argue that, compared to conventional cookers, the microwave oven is easier to clean because of its small size, lack of 'baked-on' food soil, smooth materials and, in the case of the Creda at least, a fairly uncluttered interior. The danger therefore is that any question concerned with ease of cleaning will produce a predictably favourable response pattern. To avoid this, the user is forced into a critical stance by having to pick individual features that are difficult to clean.

Q 23 Would you say that, in general, the oven is (i) quick and easy to clean, (ii) difficult and time-consuming to clean, (iii) average?

The question is asked in the above form.

Q 24 Which visible parts of the oven would you expect to show wear and tear first?

The question is asked in the above form.

Unless there is a major failure in the exterior quality of the oven, it is likely that the average user will have encountered little in the way of visible wear during the one to two years of use. The question is really intended to examine which features appear to be likely candidates for wear and tear or which, for functional reasons (eg a part of the product that is subject to frequent use) the user decides will wear badly. In either case, it provides an indication of product areas which require particular design skills to overcome "apparent" weakness.

Q 25 Is the product generally (i) robust and durable, (ii) of average durability, (iii) not particularly durable?

The question is asked in the above form. The word 'robust' is inserted in the first option only, to make clear the meaning, or intended meaning, of the word 'durable'.

Q 26 What aspect of the oven would you consider to be least safe?

The question is asked in the above form.

The question results from early interviewing with manufacturers of microwave ovens, where problems of the safety of microwave ovens had been publicised by the mass media several years previously. This had resulted in a major slump in sales from which the industry had only recently started to recover. In early user interviews it became apparent that nearly all the users had a knowledge of the criticisms made but, at the same time, expressed the fact that they considered their oven perfectly safe. In other words, the users frequently expressed faith in the product's safety record, whilst at the same time describing evidence to the contrary, which they were in no real position to prove or disprove. It is therefore felt that there must be doubts within the consumer's mind about the safety problem, which could only be probed indirectly.

This question is intended to force the user to make a critical judgement about a variety of potential safety hazards, to see how frequently microwave leakage is referred to relative to other hazards. Question 27 is intended to document the superficial response, and option (viii) in Question 27 to provide firm evidence that the user is concerned enough about potential leakage to desire the inclusion of a leakage safety monitor.

Q 27 In general, would you say that the oven is (i) very safe, (ii) moderately safe, (iii) unsafe?

The question is asked in the above form.

Q 28 Which of the following features would you wish to have incorporated in the oven if the extra cost was small? I shall read out the complete list then repeat it slowly so that you can indicate yes or no to each feature.

The question is asked in the above form, the motives behind each optional feature being described individually. One purpose of this question is to probe the attitude of the user to automation. A number of the proposed features may not be technically feasible, which does not affect the validity of the responses. What is desired is an indication of the type of automation that users require and an indication of those areas that the user is content, or perhaps even keen, to continue operating manually.

(i) The oven automatically detects any spillage of liquid or food and switches itself off, eg boiling over is prevented.

This feature is designed to represent a method of increasing the 'foolproof' potential of the product. As has been stated previously, the Creda, when contrasted with many other ovens, has a level of apparent simplicity, which may be one of the criteria for selection by the user. If this is the case, a critical bias against many of the features may have to be taken into account. The user may well see this feature as a threat to his level of involvement with the product and a diminution of the degree of skill normally associated with the preparation of food.

(ii) The oven cannot be switched on when empty.

With a minority of users it is necessary to point out that the operation of the oven whilst empty may damage the magnetron.

Again this feature would add to the foolproof operation of the product but, in this particular case, the automation is linked directly to what might be viewed as a technological inadequacy of the product. If this is the case, the user is likely to desire the feature. Any view to the contrary must be seen as a reaction against the added costs and inconvenience of increased technological complexity.

(iii) The oven cannot be switched on with metal objects inside it.

The question is very similar to the previous one and, to a great extent, the results should be similar for each user. Again it is intended to use this type of result to clarify

the user attitude to automation and to find out how this varies when the automation is de-skilling, as opposed to this case, where it is linked to a purely technological phenomenon.

(iv) The oven is self-cleaning.

The question is usually extended to include a description: "A chemical causes the food deposited on the sides of the oven to flake off, under the action of microwaves".

The intention is to test the user attitude to the existing cleaning process, to determine whether there is any feeling that this could be improved.

(v) The oven has a built-in thermometer that can be inserted into food.

The intention is to investigate the user's attitude to a device which is designed to give increased information about the progress of the cooking process. In this sense it is a very different feature compared with points (i) and (ii). It is the type of feature which is related to a skilled involvement with the product, and thus the general comparison can be made directly with (i) and (ii) results.

(vi) The oven can be programmed so that the power cycle can change automatically, eg when defrosting the setting can go from low power to high without resetting.

The question is intended to provide the user with an easily understood example of a typical micro-processor control application, and to determine his attitude to it.

(vii) A turntable is included, to rotate the food automatically.

This example is concerned with a characteristic which some users will have been aware of at the purchase stage, but presumably came to the conclusion that it was not particularly desirable. An affirmative answer would thus indicate that the user had acknowledged an incorrect buying decision or one which had demanded an important compromise.

(viii) The oven gives a warning if any microwave leakage occurs.

The reasons for the inclusion of this feature were described in Question 27.

(ix) The oven can be set to stir liquids whilst cooking.

The question is usually followed by the following example:

"For example, if you want to make scrambled egg it will stir the liquid within the oven, so that you do not have to keep taking it out and stirring it."

The general intention of the question is to provide a feature which represents increased automation, whilst reducing a traditional chore rather than a skill.

Under the section for "NOTES", three other questions are asked, depending on the attitude of the user to the length of the interview by this stage.

Self-image Question

This takes the form "Amongst your acquaintances, do you tend to be the person who buys new products before the others? . . . or not?"

The purpose is to determine which users see themselves as innovation-adopters. Where indications of new product lines in the user environment are noted (eg the presence of a video tape recorder), these are recorded.

Percentage Use

The user is asked to allocate a percentage to how much cooked food is prepared on the microwave oven, as compared with the traditional cooker.

This is thought to be a good indication of the degree of use that the product is put to - it illustrates the relative success of the product and also the degree of flexibility of the user in adapting to the new technique.

Fulfilment of Expectations

The user is asked whether the product has been more useful or less useful than anticipated prior to its purchase.

Again this is intended to be an indication of the long-term success of the product.

The remaining portion of the questionnaire is devoted to descriptive records of the user.

Apart from the name and address, the age group within a 5 year block is noted. This is to be cross-checked with the designer's conception of his expected target market.

Similarly notes are made on the socio-economic group, in social class terms and also in terms of whether the user is an owner-occupier or an occupier of rented accommodation.

This is also to be compared with the designer's definition of his intended market.

The user is finally asked to give a self-description or occupation.

NOTES

- 1 Ziziros, M: Design Magazine, Jan 1979, No 361, p 42.
- 2 Microwave Cooking with Creda - Instruction Manual, 40B-0005G, Issue 2, July 1978, p 8.
- 3 Ibid, p 7.
- 4 Ibid.
- 5 Baumgarten, S A: The Innovative Communicator in the Diffusion Process, Journal of Marketing Research, Vol XII (Feb 1975), pp 12-18.

6.5.2 THE DESIGNER QUESTIONS

In this section, as in the user question description, the purpose and presentation of the questions is discussed. However, because of the assumed degree of knowledge of the design interviewees, the majority of questions require fewer probes and hence there is little variation in the form and pattern of the questioning. It is not therefore intended to cover each question, but only those about which extra information is involved.

The questionnaire was put to the interviewee in the exact order of the printed document.

Questions 1 to 47

This section was introduced in a similar way to the technique employed with the user group. The interviewee was told that this part of the research was intended to find out how users perceived and understood the visual characteristics of the product. In order to do this, accurate information about the reasons for the existence of the characteristics was required from the designer. The interviewee was instructed to give the main reasons why the design features were decided on. If he did not know, he was asked not to guess but to provide the name of someone in the company who did. The choice cards used in the user questionnaire were not required, since it was assumed that the interviewee's involvement with the production process would familiarise him with the general motives underlying design decisions.

It is recognised that, in asking for the main reasons, the interviewee is in effect being asked to judge the level of importance of particular motives. The danger is that occasionally the individual may miscalculate and either dismiss an important aspect or include an unimportant one. However, the fact that more than one designer is interviewed is bound to reduce this potential error. Also, it is thought to be preferable to employ such a ranking technique, rather than allowing possible insignificant details to dominate the answers.

Support Questions

As the forms of the questions differ from those in the user questionnaire, each is described on an individual basis in this section. The numerical listing is related to the listing of the user questionnaire. Where there is no parallel question (length of period of use, for example), the numbers have been deleted.

Q 3 What would you say are the main attractions of microwave cooking for consumers? Would you rank these in order please.

The general aim of this question is to determine how accurately the designer is able to predict the expectations of the market - any significant deviation must be seen as a potential source of design error, although the nature of the deviation defines the degree to which this is significant. The rank order is similarly used as a means of determining the significance of any mis-match, although it may not always be possible for the interviewee to provide a ranked order.

Q 4 What are the main attractions of the Creda, as opposed to other models? Would you rank these in order.

It is important that the interviewee is told to make the comparison between the Creda and the competing products that were on sale at the time the user group was making its purchase, and not models which are new to the current market. Again the rank order may or may not be possible.

Q 5 (What was the most important of the Creda features?)
A question inserted by Creda in the original user questionnaire and no longer required.

Q 6 As the idea of microwave cooking is fairly new to most people, in what ways would you expect prospective purchasers to find out about and obtain information on the oven?

The question is designed to determine the designer's views about the purchase related to consumer information. A comparison of the two sets of information could, in theory, yield information about the relative importance of an explicit sales identity within the product itself. For example, if the designer is convinced that most users become aware of the product through secondary information sources such as advertising, yet the user group relies predominantly on access to the product itself or verbal explanation by a trained demonstrator, then there might well be a case for reconsidering the nature of the design relative to initial market impact.

Q 7 I would like you to tell me which of the following you would expect to be the most important factor in influencing prospective users: (i) LISTENING to what friends or salesmen said about the oven; (ii) READING about the oven in books, magazines, etc; (iii) LOOKING at the oven in the shops or pictured in magazines. Which would be the second most important?

In this question comparison, it is intended that some

knowledge about the relative importance of sensory influences on the purchase decision is revealed. The answers will indicate the level of importance that the designer attaches to his own work, compared with the influences of perceivable characteristics on the user at the purchase stage. Part (iii) of the question is particularly significant for this.

Q 8 Compared with other consumer durables, would you say that choosing a microwave oven is generally (i) more difficult; (ii) about the same; (iii) easier?

It is likely that the design interviewees will assume that the purchase of an unusual, technologically innovative product with a number of competitors, will prove difficult for the consumer. Such an assumption, whether correct or incorrect, may affect the design process by calling into question the degree of visual explicitness of the product.

Q 9 (Question space for additional purchase question)

Learning to Use the Product

Q 10 Would you say that the average user (i) read all the instructions before use; (ii) read a few of the instructions before use; (iii) read none of the instructions before use?

The predictable nature of the pilot user responses is potentially reflected in this design question. Just as the user is inclined to state that he has read all the instructions, it is likely that the designer will tend to make the assumption that the user would read only some or none of the instructions before use. The findings will be limited in any case by the fact that the question may require a self-critical response from the user, which may or may not be forthcoming. Ideally, an accurate result would require an elaborate test in which the user was tested on his supposed understanding of the instructions. However, this technique is not within the scope of the already lengthy questionnaire.

Q 11 What would you expect to be the most common difficulties and mistakes made by users when they first operate the oven?

With the designer group the nature of the response is likely to be less specific than the user group response, since if a difficulty is encountered by the user it will have a well-defined, individual quality, whilst the designer is forced by the question to speculate about general possibilities. In comparing the results, therefore, it is necessary to group the user responses into general categories to match the design responses.

- Q 12 Is there anything that you now feel could have been modified in the oven that would have made it easier to learn to use - eg more instructions on the product itself or different control arrangements?

In the case of the Creda microwave oven, a unique situation exists related to this question, in that the model to which the questionnaire was applied has subsequently been redesigned. Many of the design changes that have been made result from a re-evaluation by the designers and, as such, provide some of the answers to the above question. However, it would be a mistake to assume that all of the design group's intentions have been incorporated in the new model - thus there is still a need for the above question to be put verbally.

Product Identity/Style

- Q 13 The style of a motor car can be described using a variety of words, eg sporty, sleek, compact, luxurious, etc. What words would you use to describe the style of the oven?

It would be incorrect to assume that the members of the design group would find it easier than the user group to answer this question. Certainly if the designer is used to describing essentially visual characteristics in verbal terms, (if he lectures or writes about design, for example), then one would expect an informative response. The realities of the practice of industrial design, however, may not demand such specialised forms of communication, and it is therefore necessary to apply the other more probing questions contained in this section.

- Q 14 I would like you to look at these photographs of other microwave ovens. Do you prefer the look of either of them to the Creda? Why do you prefer it?

In this question the designer is shown the identical photographic samples used in the consumer interviews.

- Q 15 How, if at all, would you improve the way that the Creda looks?

Similar points arise to those in Question 12 with respect to the redesigned model, although again both the verbal answer and the new oven design must be used for the comparison.

- Q 16 What would you say is the least attractive feature of the oven?

When put to the designer, this question would appear to call for a certain amount of self-criticism, in which the interviewee might be reluctant to indulge. It is believed

however that the fact that industrial design is usually carried out within a group of other disciplines may reduce the sense of self-criticism in favour of delegated criticism of the group performance. This would undoubtedly make it easier for the designer to give a direct answer.

Q 17 Would you say that the oven is (i) ugly, (ii) good looking, (iii) of average looks?

Q 18 Are there any aspects of the way the oven looks that you feel would not fit in with the decor and appliances found in the average user's kitchen?

There may be no mechanism by which the designer would be brought into contact with the intended environment for his product; any design decisions that are made about such an environment may be derived from rather remote sources. In the white-goods area, for example, great reliance is often placed on the information, preferences and opinions of the retailer. Knowledge about the consumer is sometimes seen, in the absence of formal market research, to be quite suitably acquired from such indirect sources.

Q 19 In general, would you say that, in visual terms, the oven would fit in (i) very well, (ii) moderately well, (iii) not well, with the average user's decor and other appliances.

Q 20 Do you feel that any of the features have a low quality of finish or standard of workmanship?

As with some of the previous questions, the possibly self-critical bias is, to a great extent, negated by another factor. It is possible that the design group view the quality of finish and standard of workmanship as being something outside their immediate field of responsibility.

Q 21 Would you say that the quality of finish or standard of workmanship of the oven is (i) high quality, (ii) of average quality, (iii) low quality?

Q 22 Which parts of the oven would you say are the most difficult to clean?

It is unlikely, but not inconceivable, that the t i p designer would not actually try out the product when it has been manufactured. This question must be considered therefore in terms of both possibilities: either that the designer's response is predicted from the inherent characteristics of the product, or he has used the product for a trial.

Q 23 Would you say that, in general, the oven is (i) quick and easy to clean, (ii) difficult to clean, (iii) average?

Q 24 Which visible parts of the oven would you expect to show signs of wear and tear first?

It is possible that the designer's response to this question will represent an informed prediction of how the product will age. However, the fact that the product is relatively new to the market means that there will have been little opportunity to obtain feedback on wear and tear (unless something has gone drastically and immediately wrong). The designer must therefore rely on his own experience of the way materials and finishes perform and apply this to the product and into the predicted mode of use/user environment. It is this rather complex ability that the question comparison examines.

Q 25 Would you say that the oven is generally (i) robust and durable, (ii) of average durability, (iii) not particularly durable?

Q 26 What aspect of the oven would you consider to be least safe?

This is perhaps an unlikely question to be answered accurately, since it implies a self and company criticism with potentially much graver consequences than those concerned with pure aesthetics. It is possible that the form of the answer, rather than its content, will indicate areas of doubt about the safety factors. As with Question 24, the designer may not yet know a great deal about post-market safety performance.

Q 27 In general, would you say that the oven is (i) very safe, (ii) moderately safe, (iii) unsafe?

It is unlikely, for the reasons mentioned in the previous question, that the reply will indicate that the product is unsafe. However, this is included in the list of possibilities so that the "moderately safe" response will not imply total criticism. A response in this form would indicate some clear doubt about the safety aspect.

Q 28 Which of the following features would you expect the average user would like to see incorporated in the product if the extra cost was small?

As in previous questions, the latest model exhibits some of the listed possibilities - the temperature probe, for example - although it must be borne in mind that not all the design proposals can be put into practice in a new model which is an "improved version" and is not redesigned from basics.

The most difficult area of this section is the questioning devoted to purely hypothetical, technological features, like the ability of the oven to detect spillage and switch itself off. It is probably technically possible to produce

a product with this facility but not, at the present, within the production and R & D cost constraints. Hypothetical features when studied by most users would appear neither more nor less feasible than more feasible features, such as the temperature probe. The situation changes when the question is put to the more technologically informed design group. It is therefore important that the design interviewee appreciates the abstracted nature of the technology and considers how beneficial it might be to the user, rather than how difficult it might be to design and produce.

Q 29 Would you say that the majority of users are the kind of people who tend to buy new or innovative products before everyone else?

A speculative question, if put to designers who have had no access to market research. Beneath the surface of the response may lie an indication of a general attitude to the product: whether it is an expensive, clever, status-related toy or a genuine, explicit, labour-saving machine.

Q 30 What age group or groups would you expect to be the most common users of the oven?

This is again a difficult question to answer if the designer has had no access to formal market research findings. However, the importance of informal market feedback should not be underestimated. For example, at the Creda plant there was evidence of an informal information link between the resident home economist, who was in daily contact with consumers, and marketing/design personnel. Naturally this information is entirely divorced from the original design information, as it could only exist at the post-market stage. Other evidence of information which may have contributed to the design process was found in indirect communication between the retail trade and the designers. At Creda, for example, it was common for designers to spend some time at sales exhibitions where they would come into contact with retailers, who in turn had some knowledge of the general nature of the microwave oven consumer, prior to the marketing and design of a specifically Creda product.

Q 31 What percentage of cooked food would the average user prepare in the microwave oven, as opposed to the conventional oven? Would you expect there to be a wide variation in this?

Q 32 In general, would you expect that users would get more, less or the same use out of the oven than they anticipated before purchase?

The question is intended to probe the designer's understanding of the relationship between user expectation and the realities of product use. Obviously, advertising may

play a key role in arousing, sometimes, over-expectation, but the design input itself may contribute to the product appearing more useful than it actually is.

Q 33 Could you describe the kind of background, occupation, social grouping, etc, of the typical user group or groups.

The results from this question may be detailed or very generalised and, in terms of comparison with the user results, the stated limitations of sample quality must be taken into account.

DETAILS OF DESIGN INTERVIEWEE

This information is necessary, partly to judge the appropriate weighting if some of the design responses are conflicting, by relating the degree of influence and participation of the interviewee in the design decision, and partly to define the professional role and background of the interviewee and test its relevance to the design activity.

Name

Present Position in the Company

Depending on the response, it may be necessary to enlarge on the interviewee's self-description, so that he indicates firstly the activity he is engaged in and, secondly, his general professional level within the company.

Professional Background

The principal objective is to determine whether the design decision-maker has an engineering, industrial design, marketing or any other professional background.

Role in Developing and Designing the Microwave Oven

The designer is asked to summarise this in a paragraph and, if possible, to relate his role to the other participants in the new product development programme.

Predicted Changes to the Model

Question unnecessary because a direct comparison with the subsequent model is possible.

**6.6 ANALYSIS OF THE SIGNIFICANCE OF MULTIPLE FUNCTIONS
IN SINGLE PERCEIVABLE CHARACTERISTICS**

As has been stated previously, design tends to produce perceivable characteristics with multiple roles, for a number of economic, technical and aesthetic reasons. It is perhaps this act of rationalisation which, though justifiable, must increase the ambiguity of meaning of the characteristic and perhaps lead to a greater degree of misinterpretation. It cannot be assumed that all such misinterpretation is unjustifiable in design terms, and similarly it would be equally misleading to assume the reverse. Since materials became increasingly varied and more flexible in form, design philosophy has expanded from the single "truth to materials" dogma, so that it is no longer assumed that visual identity should spring from inherent qualities. This has provided increased technical scope for the creation of illusory product qualities, which may increase the perceived general value of the product.

It is necessary therefore to discriminate between desirable and undesirable interpretations of perceivable characteristics in a systematic way, in order to assess the research findings. The implications of interpretation will vary considerably from one product and user to another and will be related to the degree of innovation. However, conclusions can be drawn by contrasting the relationships between the four general functional roles of perceivable characteristics (ie manufacturing, technological, stylistic and operational) which will be exhibited by t i p's.

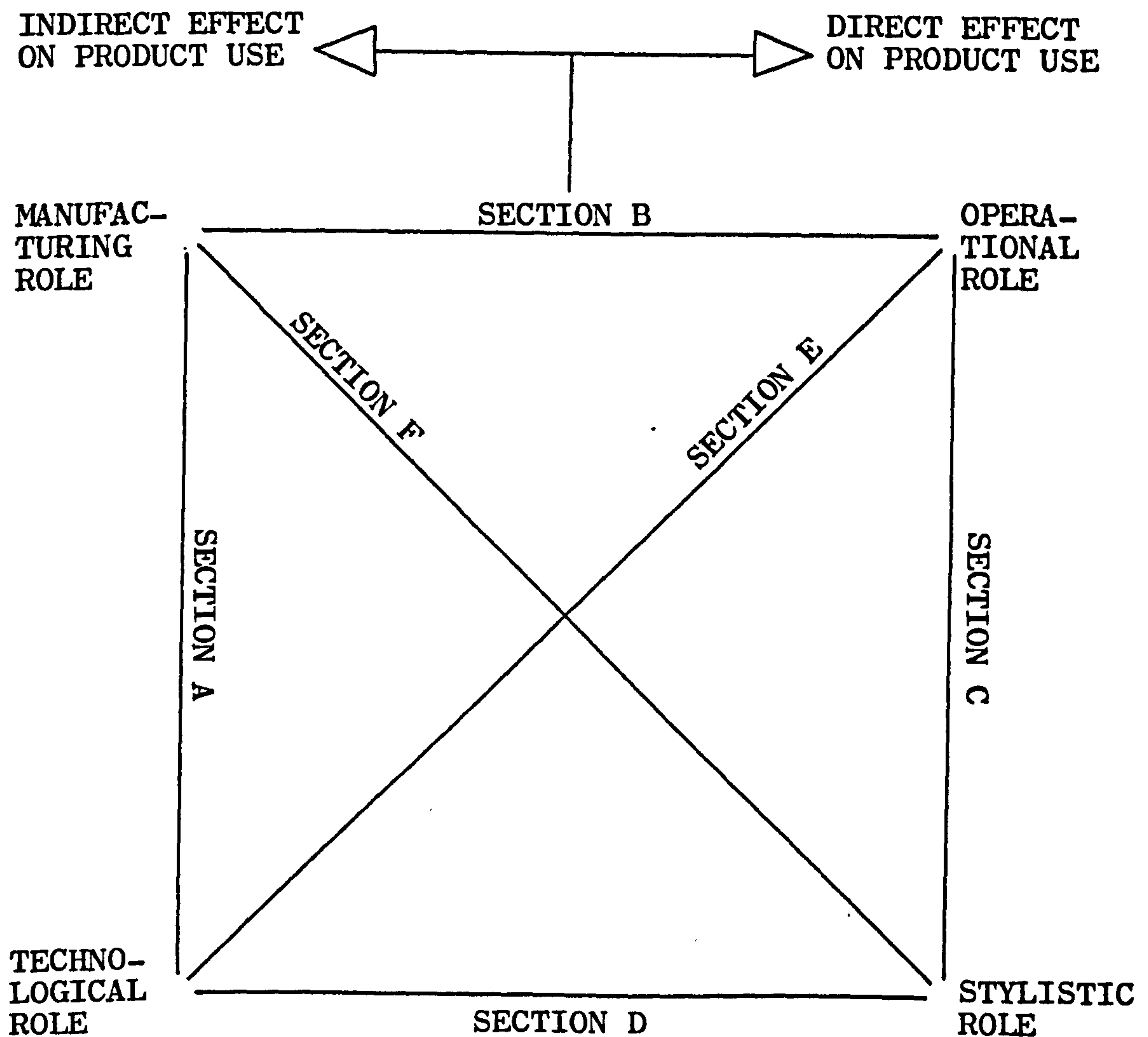
To accomplish this it is initially necessary to produce a simplified model of the interaction between the functional roles of characteristics (T10). This illustration shows the six possible permutations, A to F, and their relative level of importance at the user/product interface. The manufacturing and technological roles are essentially indirect and secondary, because lack of user perception will not necessarily affect the ability to use the product (although it may condition attitudes to it).

The operational and stylistic roles are, on the other hand, directly related to the user's activity. The following section describes the effects of mismatches in user perception across these role definitions.

A. Manufacturing/Technological Roles

It can be noted that each mismatch works in either direction: a manufacturing role misinterpreted for a technological role and vice versa. Thus for simplicity the above heading is taken to mean a manufacturing role as defined by the designer, mistaken for a technological role by the user.

This misinterpretation between two aspects which only



T10 DIAGRAM OF THE POSSIBLE ROLE PERMUTATIONS FOR INDIVIDUAL PERCEIVABLE CHARACTERISTICS

The diagram shows the relationship of Sections A to F beginning on page 129 of the Appendix, so that, for example, Section A relates to the confusion of manufacturing roles with technological roles.

indirectly affect the user is one which has little direct impact. It means in practice that the user's background knowledge of the product's manufacture and how it works is limited.

Technological/Manufacturing Role

Here the technological role as defined by the designer is mistaken for a manufacturing role by the user. Again this has little direct consequence for the user unless he is involved with self-maintenance, eg the cylinder head bolts on a car engine might be thought to be devices to facilitate the fitting of the engine to the car, in which case the user's ability to maintain the engine would be restricted.

The mismatch may have other indirect effects, in limiting overall technical know-how, so that the optimum operational parameters are affected. It is, however, unlikely that a single mismatch could cause this, but rather the sum total of several mismatches.

B. Manufacturing/Operational Role

Here the user has mistaken something which is intended purely to facilitate production for an aid to operation. The user, rather than the designer, is the final arbiter of what constitutes a useful functional characteristic. In this case, for example, it is beneficial if the manufacturing characteristic possesses some unintentional yet ultimately useful side-effect. However, it may conversely illustrate the lack of understanding of product use by the designer. Also it may possibly encourage the misuse of the product if it detracts from the necessary operational pattern.

Operational/Manufacturing Role

Here the user has assumed that a potentially useful or necessary control or ergonomic aid is merely present to aid production. Obviously this represents a direct limitation on successful product use, assuming that the characteristic is not a superfluous addition.

C. Operational/Stylistic Role

The implications are similar to those of the previous example, in that a potentially useful operational characteristic is judged to be purely decorative and, as such, rendered useless from a functional point of view. An example of this phenomenon is an applied graphic symbol which does not appear to the user to have any particular functional meaning - which is not the same as a user recognising a functional symbol but being unsure of its

meaning. In this latter case, a purely stylistic role is not assumed. It represents a mismatch or misinterpretation within the role and not across the boundaries between other roles.

Stylistic/Operational Role

Again the user may be the final arbiter in deciding what constitutes an operational characteristic. For example, in ascribing a colour to a particular product, the designer may be motivated by the single desire to maximise the visual attractiveness of the object. It is possible, however, that the user may, incorrectly, ascribe operational meanings to the colour - "It will not show the dirt", "It can be seen easily", etc.

D. Stylistic/Technological Role

In this case a purely stylistic characteristic has been mistaken for a technological attribute by the user. This phenomenon may be increased by the prevalence of "technical styling", where purely stylistic scientific symbols are built into products to encourage a spurious belief in their technological abilities and sophistication. It is possible that in so doing it encourages high expectations at the purchase stage which are unfulfilled in use. Conversely, it cannot always be assumed that such high expectations will always be tested. For example, a bogus set of cooling fins fitted to a machine may imply that it is more powerful than other models which have none. Its operational limits, however, may be above those required by the user and hence the inadequacy remains hidden. A fundamental long-term belief in the operational superiority of the product may therefore persist. However, it must be borne in mind that the various consumer testing organisations test products to their operational limits and such information may well be fed back into the user group.

Technological/Stylistic Role

In this case, although the user may not directly interact with the product's internalised technology, there are circumstances when he may unwittingly alter the externalised characteristics of the technology. For example, a device is finished in a certain colour to radiate maximum heat. If this colour is understood to be purely a stylistic device, then there is little to discourage its user from changing it for a less functionally efficient alternative.

Such circumstances may be rare, but user behaviour outside the ordinary operational running of products may be affected by this general type of misinterpretation.

Conversely, there may be cases in which the designer decides that it is preferable not to communicate that little bit of

(technical) knowledge which might be a dangerous thing. Thus, often for safety reasons, there are cases where a technological detail might be suitably disguised as a stylistic component - the screw heads which secure the covers of a high voltage device, used by untrained operators, for example.

E. Operational/Technological Role

In this case an operational function is interpreted as being something which is related to the way the product works and not a function which enables the user to operate the product. General examples of this are likely to be found where a designer has attempted to match a control (by colour, form or texture) too closely to its surroundings and where the user has not received information about this from instructions, demonstration, etc.

Technological/Operational Role

Examples of this reverse case, where a technological function is thought to fulfil an operational role, are likely to be less common than the above. This is because of the previously discussed remote nature of technological detail and thus relatively few technical characteristics would be directly observable by the user. Again it must be emphasised that the judgement of what constitutes an operational function is often the user's, and thus a technological feature which exists in an external form - a machine motor component, for example - would rarely be externalised unless there was a good physical reason (eg the cooling function of a heat exchanger exposed at the rear of a refrigerator). Where a piece of technology is externally revealed, it is sufficiently rare in the contemporary product field for the user to automatically assume that it has a non-technological function.

F. Manufacturing/Stylistic Roles

In this case a manufacturing detail, eg the markings left by mould flashing on many plastic and metal products, is interpreted by the user to be a visual decoration. As was stated earlier, this type of illusion is often seen as a highly desirable one, since a reduction in production costs has directly resulted in a more attractive, and hence more marketable, object. However, its occurrence in the questionnaire results must indicate a clear limitation of user knowledge, but knowledge which is not, in general, a barrier to successful product use.

Stylistic/Manufacturing Roles

In the reverse of the above, taking the same example, a purely decorative detail on a plastic or metal moulding

may be considered to be a by-product of the moulding process by the user. It is not, however, considered to be a particularly significant misconception, since it would not directly affect the operation of the product.

The above comparisons represent extreme cases, where the characteristics have single functions - in practice, it is likely that many would fulfil multiple roles and hence comparison will be difficult and complex. It is now necessary for the main limitations of the technique so far described to be discussed.

Perceivable Characteristics that are Mismatched within Identical Functional Groups

Four general functional groups have been defined within which the purpose of all perceivable characteristics can be placed. These are: manufacturing, technological, stylistic and operational functional roles. The significance of mismatched perception of one functional role for another has been assessed for all the possible permutations. However, it is inevitable that mismatches will occur between design intentions and user perceptions within the same functional groups, which may be as significant as those which occur between different functional groups.

To give a simple example, a product may have a number of controls, some of which are not understood or are mistakenly identified by the user. This could obviously have a highly significant effect on how the product is used, even though the general functional role (operational) has been correctly designated. Similar effects are possible in the three other functional roles, so their relative significance will be analysed separately.

Technological Role Mismatch

Mismatches which occur within this first category are indicators of lack of knowledge on the part of the user about how the product works. It is debatable how important this is, in terms of the total product technology (internal and external). At one extreme there are certain professional and skilled amateur users who require a deep understanding of internal technology, either to develop and maximise the performance of the product, or to be prepared for unusual or unpredictable operational contingencies. Within this group, it is also often the case that the operational characteristics are so complex that an understanding of the synthesised user/technology interface can only be learned by first comprehending how the internal technology functions.

At the other extreme are the untrained, relatively uninvolved product users, who depend on outside professional service

if unusual contingencies (eg an equipment malfunction) arise. This group is the group that this research has focused on and it is tempting to assume that any knowledge about the internal technology would be surplus to requirement. Certainly this is true for a large number of products, particularly those which are reliable, durable, safe, relatively foolproof and which possess fairly straightforward control interfaces - a simple pocket calculator, for example. It is less true for those products which tend to have the reverse properties, in which case the range of potential "unusual contingencies" is increased. For example, the less sophisticated dye-line copying machines, which have complicated control interfaces which rely on observation/use feedback, contain potential safety hazards - mechanical, electrical and chemical - and are not noted for their durability.

It might well be argued that this latter example would be used by predominantly trained personnel, who would be sufficiently informed to be capable of rationally resolving most contingencies. However, there are many products aimed at the untrained user which exhibit similar characteristics - pressure cookers, electric steam irons, motor cars, lawn mowers, etc - where a knowledge of underlying technical principles might be beneficial in resolving uncharacteristic product performance. (In the case of t i p's, the added difficulty arises that the user may not be able to differentiate between normal and abnormal product performance in the first place, unless directed by separate instructions.)

As has been stated in a previous chapter (Ref 1.3.4), technology has tended to become more and more internalised and remote from the user, with consequently a smaller proportion of perceivable technological detail existing externally. This development may mean that any technological detail that does remain will have no logical visual continuity, nothing which can connect it with an explanation of how the product works. A bicycle, for example, can be seen to be a coherent system of mechanical parts, whilst a television receiver appears to be a simplified enclosure with a small number of fragmented, externalised technological characteristics: the glow from a valve, a heating vent, the prominent bulge of the rear of the CRT, a speaker grill, an external aerial, etc. In the case of the t i p, by definition, less is likely to be known about the product technology by its user and hence the lack of coherence and fragmentation of the externalised technology is exaggerated.

This leads to the conclusion that there is likely to be a relatively high proportion of technological characteristics which are mismatched, compared with more established product types. It is assumed that any externalised technological characteristic is significant in use and that a misinterpreted characteristic may represent a possible

source of user difficulty. This could be obviated through design revisions; product instructions could label the characteristic correctly; the characteristic could possibly be internalised; the characteristic could have a more accurate design identity.

Stylistic Role Mismatch

A simple illustration of this type of mismatch would occur if a stylistic device employed by the designer to achieve a particular effect was perceived by the user to have an entirely different effect (eg the horizontal line was added to make the product look wider - the horizontal line makes the product look taller). In practice it has been found that not all users are able to provide verbal explanations of visual characteristics, so that any mismatches detected in the results will be unquantifiable. This is believed to be an acceptable limitation, inasmuch as the mismatching of purely stylistic details has no particular relevance to t i p design alone, but is a subject which has significance for most design fields.

The significance of stylistic roles only becomes apparent in t i p design when confused with other functional roles.

Manufacturing Role Mismatch

A general example of this would be an externalised production detail, such as a taper to allow a plastic product to be removed from a tool, being identified as a material economy.

6.7 THE FIVE STAGES OF CONSUMER INNOVATION ADOPTION

This section extends the work of Rogers⁽¹⁾ on the diffusion of innovation to discussion of the five-stage purchase process for the t i p.

(a) Awareness

Rogers⁽¹⁾ defines awareness as the point when "the individual is exposed to the innovation but lacks complete information - often becoming aware by accident".

A fundamental problem which arises from t i p selection at this stage is that, although the consumer may well be exposed in the physical sense to the innovation, he or she may be unaware of any truly innovative characteristic. The causes of this may be various: a growing confusion of product identities (as documented by Wouldhuysen in a survey of the Hanover Technology Fair); (2) the 'remote' nature of much technology, rendering functional capabilities less explicit (ref Mono); (3) the complexity of much technology and technological language obscuring the capabilities of the innovation. For many reasons, therefore, the consumer may be less frequently exposed, in a sense that creates understanding and awareness, to technological innovation than to other forms of innovation. This poses special problems in both the design and marketing of products.

(b) Interest

This is the phase, identified by Rogers, when "The individual becomes interested in the idea and seeks additional information on it".

This information search will possibly be more difficult for an innovatory product than a known quantity, simply because more information will be required. A glance at back issues of the Consumers' Association Magazine "Which" tends to confirm this view, as the descriptive information devoted to innovatory products far exceeds that devoted to non-innovatory products. For example, in the November 1979 issue there were 190 cm of columns of text devoted to microwave ovens, with a mere 53 cm devoted to ordinary electric cookers.

The matter is perhaps further complicated when the innovation is technological - for certain products it may be necessary to explain the underlying technological principles in order to demonstrate the functional characteristics. The microwave oven is a good example, where a significant proportion of sales literature is devoted to rudimentary descriptions of microwave technology. Even descriptions of the physical capacities, such as the power output, for example, may require reference to units of measurement which may be unfamiliar to many consumers. The prospective t i p purchaser is thus frequently expected to proceed through a definite learning process, even at this early stage.

Also, the fact that the product is innovatory means that certain sources of information will be reduced. Contact

with other users, for example, is bound to be restricted since, by definition, there are fewer innovatory product users around.

In a survey of pre-purchase information-seeking for new cars and major household appliances, (4) Newman and Staelin regarded the purchase decision procedure as being essentially a learning process. Their findings supported the hypothesis that the "information search varies directly with (consumer) education because the latter represents ability and interest in seeking and evaluating information". Although this study in no way seeks to apply this hypothesis to t i p's, it is envisaged that an appropriate t i p purchase may well depend upon the consumer's inherent ability just as much as on the characteristics of the products. T i p's may well demand greater learning abilities than established products and may possibly, therefore, require improved methods of conveying information about the product.

(c) Evaluation

As Rogers states, "This is the stage when the individual mentally applies the innovation to his present and anticipated future situation and then decides whether to try it. A sort of 'mental trial' occurs at the evaluation stage." (1)

It is this phase which probably poses the greatest difficulty for both the producers and users of t i p's, particularly if the innovation is discontinuous, as in the case of the pocket calculator, where the consumer may have the greatest difficulty in relating the product to his or her present and future needs without a direct trial with the product itself. A perfect example of this is contained in the Hewlett-Packard Report (ref No RM13) where market research techniques failed to predict a demand for the then unmarketed pocket calculator. User tests of a simulated calculator, however, produced data which identified a considerable demand, implying that consumers are unable to predict patterns of use of new products at an abstracted level. This is a problem for both the producer, in terms of predicting market demand for future innovatory products, and also the user.

The evaluation period is also a time when there are marked differences between 'technology push' orientated products and the 'demand pull' equivalent. If the product is induced by a demonstrable demand, Rogers' "mental trial" is bound to be dominated by a comparison of just how well the product matches up to the preconceived requirements. If, on the other hand, it is a predominantly 'technology push' product it will comprise information gathering and interpretation, and prediction of future use possibilities - a much more complex procedure.

The research method, although it does not define t i p's

in terms of these two factors, does record the differing methods of evaluation by consumers.

(d) Trial

"At the trial stage the individual uses the innovation on a small scale in order to determine its utility in his own situation. The main function of the trial stage is to demonstrate the new idea in the individual's own situation and determine its usefulness for possible complete adoption."(1)

The trial stage may or may not be part of the consumer's adoption process, either because he or she does not feel the need for one, or because a trial may not be possible. This latter cause may vary considerably from one type of product to another. Non-durable items of food, for example, may be easily sampled on a small scale prior to adoption. Similarly, articles of clothing can be tried in situ. With more durable items, trial becomes, in many cases, less convenient.

The character of the sales point also affects the opportunity to try out and test the suitability of a product. For example, hi-fi equipment - at one extreme there are retail outlets which preclude a trial, such as mail order or discount warehouses; at the other extreme certain retailers will offer home trial, demonstrations in the home, or 'approval' schemes. The research method records the type of sales outlet, together with evidence of pre-purchase trial, as it is suspected that t i p's may be retailed in ways which prevent trial (for example, mail order or "warehouse" direct selling methods).

The rapid pace of t i p manufacture is frequently reflected in aggressive retail methods once the product has reached the competition stage, which depend on high sales turnover and non-specialist sales forces. This results in many cases in a reduction in demonstration capability, together with a greater reliance upon passive information sources, sales literature, etc.

Donnelly and Etzel assume that: (5)

"Decisions to try new products actually involve two kinds of risk. Specifically, the type of consumer who tries new products appears to be willing to risk purchasing some products with which he may not be satisfied. On the other hand, the individual who restricts his purchases to products with which he is familiar is rarely dissatisfied with these familiar products. However, this individual takes the risk of avoiding many products that could provide him with more satisfaction than the ones he currently

purchases."

As the research method is concerned exclusively with t i p's, there is a distinct possibility that the consumers interviewed are more willing to risk purchasing an unproven product than the average buyer. For this reason the reduction of demonstration facilities at the retail outlet may not be considered a problem by this group.

It should also be noted that many product characteristics cannot be assessed effectively by a short term trial - such areas as reliability, safety, and overall running costs. Users whose selection of a product is based on these factors may well feel that a trial is unnecessary.

(e) Adoption

"At the adoption, the individual decides to continue the full use of the innovation. The main functions of the adoption stage are: consideration of the trial results and the decision to ratify sustained use of the innovation."(1)

Again the t i p user will have a modified behaviour pattern differing from that specified by Rogers, in that he or she may use the product for the first time only after purchase. Consideration of the trial results may thus be a case of assessing results obtained by others - either formally, as assessed by consumer publications (such as "Which", "What Buy"), or informally through contact with other users.

NOTES

- 1 Rogers, E M: Diffusion of Innovations, The Free Press, New York, 1962, pp 81-86.
- 2 Woudhuysen, J: Design, 367, p 41.
- 3 Mono, R: Design, 352, p 48.
- 4 Newman, J W and Staelin, R: Pre-purchase Information Seeking for New Cars and Major Household Appliances, Journal of Marketing Research, Vol IX (August 1972), pp 249-257.
- 5 Donnelly, H J and Etzel, M J: Degrees of Product Newness and Early Trial, Journal of Marketing Research, Vol X (August 1973), pp 295-300.

6.8 GLOSSARY OF TERMS

Adjacent Technology

Ref Woudhuysen, J: How Micros Can Rub Away the Bumps on Top and Leave New Lumps Below, Design, 366, June 1979, p 18.

When a fundamental technological advance occurs in a product it often accelerates the advance of other (adjacent) technologies within the product. For example, the micro-processor in the pocket calculator speeds up the development of the adjacent LCD display system.

Advanced Technology

Technology which is more sophisticated than that which is currently diffusing into products.

Apparent Value

The anticipated financial price of a product, judged solely on visual qualities by the potential customer.

Applied Graphics

Any two-dimensional design work on the product - includes symbols, instructions and decoration.

"Black Box" Product Style

A visual style which minimises the meaning of the product within an anonymous aesthetic and hence increases its similarities with other, equally anonymous products, serving different functions.

Closed-ended Question

An interview question designed to elicit specific information within a highly structured framework.

Consumer Needs, Consumer Requirements, Consumer Demands

Needs - Non-luxury-items or features that the consumer group considers to be necessary for tolerable living conditions.

Requirements - Products or characteristics of products for which their consumers have expressed a genuine preference and which are likely to prove beneficial in use.

Demands - Products or characteristics of products for which there is consumer preference, unrelated to post-purchase requirements.

Definition of the Stages Leading up to the Adoption of an Innovation

Defined by Rogers, E M: Diffusion of Innovations, pp 81-86.

(a) Awareness

The stage when the individual is exposed to the innovation but lacks complete information - often becoming aware unintentionally.

(b) Interest

The stage when the individual becomes interested in the idea and seeks additional information on it.

(c) Evaluation

This is the stage when the individual mentally applies the innovation to his present and anticipated future situation and then decides whether to try it.

(d) Trial

At the trial stage the individual uses the innovation on a small scale in order to determine its utility in his own situation.

(e) Adoption

At the adoption stage the individual decides to continue the full use of the innovation.

Demand-Pull

The opposite of technology-push (QV) - a product which is manufactured as a direct result of a proven consumer requirement.

Design Intentions

The purpose of individual and collective design characteristics, as expressed by the designer(s) of the product.

Firmware

Any device which acts as a store of software (information, programmes, etc) and enables it to be inserted into an interpretative machine (hardware), eg tape, card, disc, film.

Functional Information

Functional information explains or helps to explain what the product does, how it does it and how to use it. It can be either product-based, ie found on the product itself, or instruction-based, ie remote from the product in verbal or diagrammatic form.

Innovation - Types of

Robertson⁽¹⁾ has identified three different types of innovation. These are modified for use in the research with reference to technical innovations. Robertson's⁽¹⁾ definitions read as follows:

1. A Continuous Innovation - Has the least disrupting influence on established patterns. Alteration of a product is involved, rather than the establishment of a new product.
2. A Dynamically Continuous Innovation - Has more disrupting effects than a continuous innovation, although it still does not generally alter established patterns. It may involve the creation of a new product or the alteration of an existing product.
3. A Discontinuous Innovation - Involves the establishment of a new product and the establishment of new behaviour patterns.

Given this document's broad working definition of the technologically innovatory product (ref 1.2), it is clear that the two sets of definitions are mutually compatible and Robertson's can thus be modified to apply specifically to t i p's:

1. A Continuous Technologically Innovatory Product

An industrially produced object which results from the alteration of an existing product, rather than being a newly established product. It incorporates new technology, which results in new functional characteristics, which have limited disrupting influence on established patterns of behaviour.

2. A Dynamically Continuous Technologically Innovatory Product

An industrially produced object which may result from the alteration of an existing product or be a newly established product itself. It incorporates new technology, which results in new functional characteristics, which do not generally alter established patterns of behaviour.

3. A Discontinuous Technologically Innovatory Product

An industrially produced object which is newly established. It incorporates new technology, which results in new functional characteristics, which, in turn, establish new patterns of behaviour.

Interfaces

Control Interface

The parts or zones of a product which facilitate its operation by the user, including those parts or zones which provide operational information.

Input Interface

The parts or zones of a product which facilitate the intake of energy, materials or data for processing.

Internal technology

The functional mechanism of a product which is imperceptible from the exterior.

Output Interface

The parts or zones of a product which facilitate the removal of processed energy, materials or data. (In many products the input and output interfaces are combined, eg the loading door of a washing machine.)

Product Enclosure

Any exposed part or zone of the product's structure or superstructure that does not constitute any of the other defined interfaces.

Service Interface

The parts or zones of a product by means of which the user or trained individual is able to carry out maintenance.

Line Structure

Ref Sears - Roebuck Research Interview (Ref No RM14).

A line structure is a range of products with the same manufacturer and basic function but offering different secondary functions at varying price levels.

New Technology

The technology that is currently diffusing into innovative products, as opposed to innovative technology, which refers to the historical period when any given technology was or is new to the product.

Open-ended Question

An interview question which is intended to elicit a free, wide-ranging and unstructured reply, the purpose of which is to reveal unsuspected information and to encourage less

guarded responses in the interviewee.

Perceivable Characteristics

Those qualities of products - visual, tactile, audible and odorous - which are directly experienced by both users and non-users and which may indicate both real and mythical product attributes.

Pilot Questionnaire

Refers to the first trial of the questionnaire method with the user group of a single t i p. The purpose was to test the consistency of response patterns and to correct inadequate question forms.

Point of Sale

The environment or situation in which the product purchase is made - includes conventional retail outlets, mail order methods, trial periods, unseen purchase, etc.

Post-Market Research

The gathering of information from product users.

Predictive/Prescriptive Design Methods

A predictive design method is one in which a serious attempt is made to research the requirements or preferences of potential users and to use this information during the design process for decision making.

A prescriptive design method is one in which no user research is fed back into the design process, but rather an attempt is made to create new requirements and preferences as a result of the new product's design.

Pre-Pilot Questionnaire

Refers to the first application of the questionnaire method amongst a variety of products, their users and their designers. The purpose was to examine both specific and non-specific problem areas, to determine effective interview techniques and to experiment with a means of contrasting designer and user responses.

Pre-Purchase Expectations

The anticipated performance of the product in use, as predicted by the non-user.

Probe

A supplementary question used during interviews if a particular response is felt to be incomplete or inaccurate.

Producer

The individual or group responsible for the decision to design, develop, manufacture and market a product.

Product Attributes

The functional capabilities of a product - what the user may accomplish with the aid of the product - the factors which indicate the relative level of the product's performance.

Product Identity

The composite meaning of a product derived from its attributes, perceivable characteristics and associations.

Product Planning

The development of long-term strategies for the design, development and marketing of products, based on the researched prediction of technological developments, user requirements, economic considerations, company performance, market competition, social and demographic changes and manufacturing constraints. The purpose of product planning is to encourage the smooth overlap of product life-cycles, the establishment of compatible product ranges and the maximisation of the market lead time of products.

Questionnaire

Refers to the final form of the developed questionnaire, as applied to user and design groups of the single product.

Self-Service Products

Those products which represent the equivalent of industrial or commercial sector production equipment, transformed for domestic use, eg do-it-yourself equipment, washing machines, Prestel and other information systems. (See Gershuny, J: After Industrial Society?, Macmillan, 1978, p 80.)

Styling

The manipulation of visual elements by the designer for purely aesthetic purposes.

Stylised

Describes a product or characteristic in which purely aesthetic design criteria predominate.

Support Questions

The questions in the second half of the questionnaire, which are concerned with the general characteristics of

t i p use, as opposed to the non-support questions devoted to the user's comprehension of the meaning of perceivable attributes in the first part.

Technical Styling

The deployment of functional design characteristics in products for primarily non-functional motives. The introduction of superficially functional technology into products to create consumer demand primarily through its visual associations, and not because it fulfils a functional role.

Technological Assessment

"The systematic study of the effects on society that may occur when a technology is introduced, extended or modified, with special emphasis on the impacts that are unintended, indirect and delayed." - Coates, J F: Methodological Guidelines for the Social Assessment of Technology, OECD, 1975.

Technologically Innovatory Product (t i p)

A mass-produced, useful object that requires new control techniques and which exhibits new functional capabilities as a direct result of developments in its integral technology.

Technological Spin-off

The technological developments in one field creating technological opportunity in another as a by-product. In this research special reference is made to technological spin-off effects from large-scale programmes in the aero-space, military, transport and medical fields, etc, into high-volume product design.

Technology-Push

The momentum generated by existing technological research and development, which may encourage the unsuitable application of technology to products without due consideration for the needs of the consumer. The opposite of demand-pull.

Untrained User

A product user who has received no formal instruction in operating the product, such as serving a professional apprenticeship, attending a training course for commercial purposes, etc, but rather has depended on the self-teaching information supplied with the product or attended a simple sales demonstration.

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