

HUMAN-COMPUTER INTERACTION (IS252) CHAPTER 2



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FIRST SEMESTER 2019-2020**



CHAPTER 2

UNDERSTANDING AND CONCEPTUALIZING IN INTERACTION



2.1 INTRODUCTION

IMAGINE YOU HAVE BEEN ASKED TO DESIGN AN APPLICATION TO LET PEOPLE ORGANIZE, STORE, AND RETRIEVE THEIR EMAIL IN A FAST, EFFICIENT AND ENJOYABLE WAY. WHAT WOULD YOU DO? HOW WOULD YOU START? WOULD YOU BEGIN BY SKETCHING OUT HOW THE INTERFACE MIGHT LOOK, WORK OUT HOW THE SYSTEM ARCHITECTURE WILL BE STRUCTURED, OR EVEN JUST START CODING ALTERNATIVELY, WOULD YOU START BY ASKING USERS ABOUT THEIR CURRENT EXPERIENCES OF SAVING EMAIL, LOOK AT EXISTING EMAIL TOOLS AND, BASED ON THIS, BEGIN THINKING ABOUT WHY, WHAT, AND HOW YOU WERE GOING TO DESIGN THE APPLICATION?

INTERACTION DESIGNERS WOULD BEGIN TO DOING IT. IT IS IMPORTANT TO REALIZE THAT HAVING A CLEAR UNDERSTANDING OF WHAT, WHY, AND HOW YOU ARE GOING TO DESIGN SOMETHING, BEFORE WRITING ANY CODE, CAN SAVE ENORMOUS AMOUNTS OF TIME AND EFFORT LATER ON IN THE DESIGN PROCESS. ILL-THOUGHT-OUT IDEAS, INCOMPATIBLE AND UNUSABLE DESIGNS CAN BE IRONED OUT WHILE IT IS RELATIVELY EASY AND PAINLESS TO DO. ONCE IDEAS ARE COMMITTED TO CODE (WHICH TYPICALLY TAKES CONSIDERABLE EFFORT, TIME, AND MONEY), THEY BECOME MUCH HARDER TO THROW AWAY AND MUCH MORE PAINFUL.

THE MAIN AIMS OF THIS CHAPTER ARE TO:

- 1- EXPLAIN WHAT IS MEANT BY THE PROBLEM SPACE.
- 2- EXPLAIN HOW TO CONCEPTUALIZE INTERACTION.
- 3- DESCRIBE WHAT A CONCEPTUAL MODEL IS AND EXPLAIN THE DIFFERENT KINDS.
- 4- DISCUSS THE PROS AND CONS OF USING INTERFACE METAPHORS AS CONCEPTUAL MODELS.

2.2 UNDERSTANDING THE PROBLEM SPACE

IN THE PROCESS OF CREATING AN INTERACTIVE PRODUCT, IT CAN BE TEMPTING TO BEGIN AT THE "NUTS AND BOLTS" LEVEL OF THE DESIGN. BY THIS, WE MEAN WORKING OUT HOW TO DESIGN THE PHYSICAL INTERFACE AND WHAT INTERACTION STYLES TO USE (E.G., WHETHER TO USE MENUS, FORMS, SPEECH, ICONS, OR COMMANDS). A PROBLEMS WITH TRYING TO SOLVE A DESIGN PROBLEM BEGINNING AT THIS LEVEL IS THAT.

FOR EXAMPLE, CONSIDER THE PROBLEM OF PROVIDING DRIVERS WITH BETTER NAVIGATION AND TRAFFIC INFORMATION. HOW MIGHT YOU ACHIEVE THIS? ONE COULD TACKLE THE PROBLEM BY THINKING STRAIGHT AWAY ABOUT A GOOD TECHNOLOGY OR KIND OF INTERFACE TO USE. SINCE IT CAN BE USEFUL FOR INTEGRATING ADDITIONAL INFORMATION WITH AN ONGOING ACTIVITY, IT COULD BE EFFECTIVE FOR DISPLAYING INFORMATION TO DRIVERS WHO NEED TO FIND OUT WHERE THEY ARE GOING AND WHAT TO DO AT CERTAIN POINTS DURING THEIR JOURNEY. IN PARTICULAR, IMAGES OF PLACES AND DIRECTIONS TO FOLLOW COULD BE PROJECTED INSIDE THE CAR, ON THE DASHBOARD OR REAR-VIEW MIRROR. HOWEVER, THERE IS A MAJOR PROBLEM WITH THIS PROPOSAL: IT IS LIKELY TO BE VERY UNSAFE. IT COULD EASILY DISTRACT DRIVERS, LURING THEM TO SWITCH THEIR ATTENTION FROM THE ROAD TO WHERE THE IMAGES WERE BEING PROJECTED.

A PROBLEM IN STARTING TO SOLVE A DESIGN PROBLEM AT THE PHYSICAL LEVEL, THEREFORE, IS THAT USABILITY GOALS CAN BE EASILY OVERLOOKED. IT IS BETTER TO MAKE THESE KINDS OF DESIGN DECISIONS AFTER UNDERSTANDING THE NATURE OF THE PROBLEM SPACE. BY THIS, WE MEAN CONCEPTUALIZING WHAT YOU WANT TO CREATE AND ARTICULATING WHY YOU WANT TO DO SO. THIS REQUIRES THINKING THROUGH HOW YOUR DESIGN WILL SUPPORT PEOPLE IN THEIR EVERYDAY OR WORK ACTIVITIES. IN PARTICULAR, YOU NEED TO ASK YOURSELF WHETHER THE INTERACTIVE PRODUCT YOU HAVE IN MIND WILL ACHIEVE WHAT YOU HOPE IT WILL. IF SO, HOW? IN THE ABOVE EXAMPLE, THIS INVOLVES FINDING OUT WHAT IS PROBLEMATIC WITH EXISTING FORMS OF NAVIGATING WHILE DRIVING (E.G., TRYING TO READ MAPS WHILE MOVING THE STEERING WHEEL) AND HOW TO ENSURE THAT DRIVERS CAN CONTINUE TO DRIVE SAFELY WITHOUT BEING DISTRACTED.

A FRAMEWORK FOR EXPLICATING ASSUMPTIONS

REASONING THROUGH YOUR ASSUMPTIONS ABOUT WHY SOMETHING MIGHT BE A GOOD IDEA ENABLES YOU TO SEE THE STRENGTHS AND WEAKNESSES OF YOUR PROPOSED DESIGN. IN SO DOING, IT ENABLES YOU TO BE IN A BETTER POSITION TO COMMENCE THE DESIGN PROCESS. WE HAVE SHOWN YOU HOW TO BEGIN THIS, THROUGH OPERATIONALIZING RELEVANT USABILITY GOALS. IN ADDITION, THE FOLLOWING QUESTIONS PROVIDE A USEFUL FRAMEWORK WITH WHICH TO BEGIN THINKING THROUGH THE PROBLEM SPACE:

- ARE THERE PROBLEMS WITH AN EXISTING PRODUCT? IF SO, WHAT ARE THEY? WHY DO YOU THINK THERE ARE PROBLEMS?
- WHY DO YOU THINK YOUR PROPOSED IDEAS MIGHT BE USEFUL? HOW DO YOU ENVISION PEOPLE INTEGRATING YOUR PROPOSED DESIGN WITH HOW THEY CURRENTLY DO THINGS IN THEIR EVERYDAY OR WORKING LIVES?
- HOW WILL YOUR PROPOSED DESIGN SUPPORT PEOPLE IN THEIR ACTIVITIES? IN WHAT WAY DOES IT ADDRESS AN IDENTIFIED PROBLEM OR EXTEND CURRENT WAYS OF DOING THINGS? WILL IT REALLY HELP?

2.3 CONCEPTUAL MODELS

"THE MOST IMPORTANT THING TO DESIGN IS THE USER'S CONCEPTUAL MODEL. EVERYTHING ELSE SHOULD BE SUBORDINATED TO MAKING THAT MODEL CLEAR, OBVIOUS, AND SUBSTANTIAL. THAT IS ALMOST EXACTLY THE OPPOSITE OF HOW MOST SOFTWARE IS DESIGNED."

BY A CONCEPTUAL MODEL IS MEANT:

A DESCRIPTION OF THE PROPOSED SYSTEM IN TERMS OF A SET OF INTEGRATED IDEAS AND CONCEPTS ABOUT WHAT IT SHOULD DO, BEHAVE AND LOOK LIKE, THAT WILL BE UNDERSTANDABLE BY THE USERS IN THE MANNER INTENDED.

ONCE A SET OF POSSIBLE WAYS OF INTERACTING WITH AN INTERACTIVE SYSTEM HAS BEEN IDENTIFIED, THE DESIGN OF THE CONCEPTUAL MODEL THEN NEEDS TO BE THROUGH IN TERMS OF ACTUAL CONCRETE SOLUTIONS. THIS ENTAILS WORKING OUT THE BEHAVIOR OF THE INTERFACE, THE PARTICULAR INTERACTION STYLES THAT WILL BE USED, AND THE "LOOK AND FEEL" OF THE INTERFACE. AT THIS STAGE OF "FLESHING OUT," IT IS ALWAYS A GOOD IDEA TO EXPLORE A NUMBER OF POSSIBLE DESIGNS AND TO ASSESS THE MERITS AND PROBLEMS OF EACH ONE.

ANOTHER WAY OF DESIGNING AN APPROPRIATE CONCEPTUAL MODEL IS TO SELECT AN INTERFACE METAPHOR. THIS CAN PROVIDE A BASIC STRUCTURE FOR THE CONCEPTUAL MODEL THAT IS COUCHED IN KNOWLEDGE USERS ARE FAMILIAR WITH. EXAMPLES OF WELL-KNOWN INTERFACE METAPHORS ARE THE DESKTOP AND SEARCH ENGINES.

HERE, WE DESCRIBE THE DIFFERENT KINDS OF CONCEPTUAL MODELS, INTERFACE METAPHORS, AND INTERACTION PARADIGMS TO GIVE YOU A GOOD UNDERSTANDING OF THE VARIOUS TYPES PRIOR TO THINKING ABOUT HOW TO DESIGN THEM.

THERE ARE A NUMBER OF DIFFERENT KINDS OF CONCEPTUAL MODELS. THESE CAN BE BROKEN DOWN INTO TWO MAIN CATEGORIES: THOSE BASED ON ACTIVITIES AND THOSE BASED ON OBJECTS.

2.3.1 CONCEPTUAL MODELS BASED ON ACTIVITIES

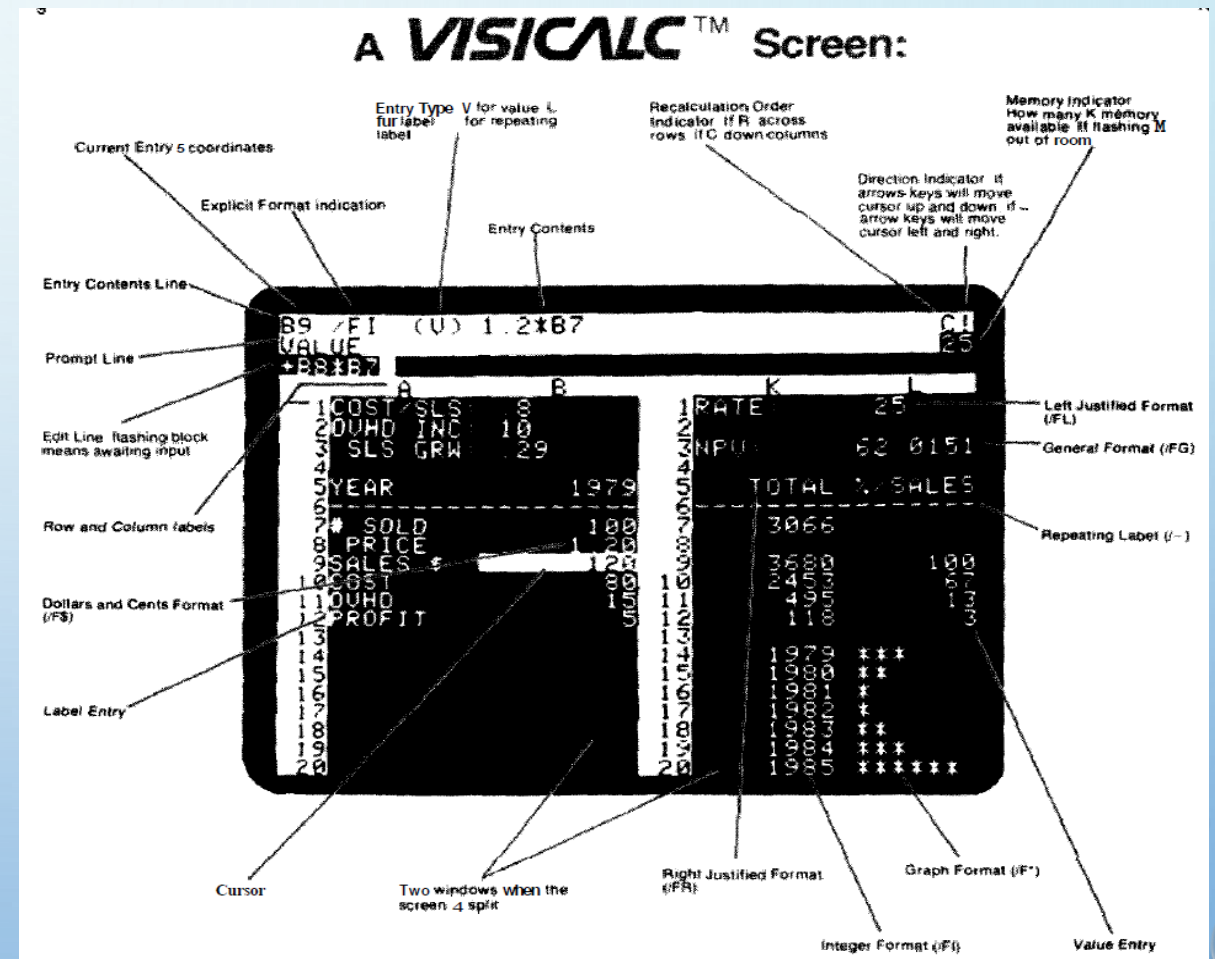
- THE MOST COMMON TYPES OF ACTIVITIES THAT USERS ARE LIKELY TO BE ENGAGED IN WHEN INTERACTING WITH SYSTEMS ARE:
- INSTRUCTING
- CONVERSING
- MANIPULATING AND NAVIGATING
- EXPLORING AND BROWSING
- A FIRST THING TO NOTE IS THAT THE VARIOUS KINDS OF ACTIVITY CAN BE CARRIED OUT TOGETHER. FOR EXAMPLE, IT IS POSSIBLE FOR SOMEONE TO GIVE INSTRUCTIONS WHILE CONVERSING OR NAVIGATE AN ENVIRONMENT WHILE BROWSING. HOWEVER, EACH HAS DIFFERENT PROPERTIES AND SUGGESTS DIFFERENT WAYS OF BEING DEVELOPED AT THE INTERFACE.

- **THE FIRST ONE** IS BASED ON THE IDEA OF LETTING THE USER ISSUE INSTRUCTIONS TO THE SYSTEM WHEN PERFORMING TASKS. THIS CAN BE DONE IN VARIOUS INTERACTION STYLES: TYPING IN COMMANDS, SELECTING OPTIONS FROM MENUS IN A WINDOWS ENVIRONMENT OR ON A TOUCH SCREEN, SPEAKING ALOUD COMMANDS, PRESSING BUTTONS, OR USING A COMBINATION OF FUNCTION KEYS.
- 1. INSTRUCTING: THIS KIND OF CONCEPTUAL MODEL DESCRIBES HOW USERS CARRY OUT THEIR TASKS THROUGH INSTRUCTING THE SYSTEM WHAT TO DO. EXAMPLES INCLUDE GIVING INSTRUCTIONS TO A SYSTEM TO PERFORM OPERATIONS LIKE TELL THE TIME, PRINT A FILE, AND REMIND THE USER OF AN APPOINTMENT. A DIVERSE RANGE OF DEVICES DESIGNED BASED ON THIS MODEL, INCLUDE HI-FI SYSTEMS, ALARM CLOCKS, COMPUTERS.
- **THE SECOND ONE** IS BASED ON THE USER CONVERSING WITH THE SYSTEM AS THOUGH TALKING TO SOMEONE ELSE. USERS SPEAK TO THE SYSTEM OR TYPE IN QUESTIONS TO WHICH THE SYSTEM REPLIES VIA TEXT OR SPEECH OUTPUT.
- 2. CONVERSING: THIS CONCEPTUAL MODEL IS BASED ON THE IDEA OF A PERSON CONVERSING WITH A SYSTEM, WHERE THE SYSTEM ACTS AS A DIALOG PARTNER. IN PARTICULAR, THE SYSTEM IS DESIGNED TO RESPOND IN A WAY ANOTHER HUMAN BEING MIGHT WHEN HAVING A CONVERSATION WITH SOMEONE ELSE. IT DIFFERS FROM THE PREVIOUS CATEGORY OF INSTRUCTING IN BEING INTENDED TO REFLECT A MORE TWO-WAY COMMUNICATION PROCESS, WHERE THE SYSTEM ACTS MORE LIKE A PARTNER THAN A MACHINE THAT SIMPLY OBEYS ORDERS. THIS KIND OF CONCEPTUAL MODEL HAS BEEN FOUND TO BE MOST USEFUL FOR APPLICATIONS IN WHICH THE USER NEEDS TO FIND OUT SPECIFIC KINDS OF INFORMATION OR WANTS TO DISCUSS ISSUES. EXAMPLES INCLUDE ADVISORY SYSTEMS, HELP FACILITIES, AND SEARCH ENGINES. THE PROPOSED TOURIST APPLICATION DESCRIBED EARLIER WOULD FIT INTO THIS CATEGORY.

- **THE THIRD TYPE** IS BASED ON ALLOWING USERS TO MANIPULATE AND NAVIGATE THEIR WAY THROUGH AN ENVIRONMENT OF VIRTUAL OBJECTS. IT ASSUMES THAT THE VIRTUAL ENVIRONMENT SHARES SOME OF THE PROPERTIES OF THE PHYSICAL WORLD, ALLOWING USERS TO USE THEIR KNOWLEDGE OF HOW PHYSICAL OBJECTS BEHAVE WHEN INTERACTING WITH VIRTUAL OBJECTS.
- 3. MANIPULATING AND NAVIGATING: THIS CONCEPTUAL MODEL DESCRIBES THE ACTIVITY OF MANIPULATING OBJECTS AND NAVIGATING THROUGH VIRTUAL SPACES BY EXPLOITING USERS' KNOWLEDGE OF HOW THEY DO THIS IN THE PHYSICAL WORLD. FOR EXAMPLE, VIRTUAL OBJECTS CAN BE MANIPULATED BY MOVING, SELECTING, OPENING, CLOSING, AND ZOOMING IN AND OUT OF THEM. EXTENSIONS TO THESE ACTIONS CAN ALSO BE INCLUDED, SUCH AS MANIPULATING OBJECTS OR NAVIGATING THROUGH VIRTUAL SPACES, IN WAYS NOT POSSIBLE IN THE REAL WORLD. FOR EXAMPLE, SOME VIRTUAL WORLDS HAVE BEEN DESIGNED TO ALLOW USERS TO TELEPORT FROM PLACE TO PLACE OR TO TRANSFORM ONE OBJECT INTO ANOTHER.
- **THE FOURTH KIND** IS BASED ON THE SYSTEM PROVIDING INFORMATION THAT IS STRUCTURED IN SUCH A WAY AS TO ALLOW USERS TO FIND OUT OR LEARN THINGS, WITHOUT HAVING TO FORMULATE SPECIFIC QUESTIONS TO THE SYSTEM.
- 4. EXPLORING AND BROWSING: THIS CONCEPTUAL MODEL IS BASED ON THE IDEA OF ALLOWING PEOPLE TO EXPLORE AND BROWSE INFORMATION, EXPLOITING THEIR KNOWLEDGE OF HOW THEY DO THIS WITH EXISTING MEDIA (E.G., BOOKS, MAGAZINES, TV, RADIO, LIBRARIES, PAMPHLETS, BROCHURES). WHEN PEOPLE GO TO A TOURIST OFFICE, A BOOKSTORE, OR A DENTIST'S SURGERY, OFTEN THEY SCAN AND FLICK THROUGH PARTS OF THE INFORMATION DISPLAYED, HOPING TO FIND SOMETHING INTERESTING TO READ. CD-ROMS, WEB PAGES, PORTALS AND E-COMMERCE SITES ARE APPLICATIONS BASED ON THIS KIND OF CONCEPTUAL MODEL. MUCH THOUGHT NEEDS TO GO INTO STRUCTURING THE INFORMATION IN WAYS THAT WILL SUPPORT EFFECTIVE NAVIGATION, ALLOWING PEOPLE TO SEARCH, BROWSE, AND FIND DIFFERENT KINDS OF INFORMATION.

2.3.2 CONCEPTUAL MODELS BASED ON OBJECTS

THE SECOND CATEGORY OF CONCEPTUAL MODELS IS BASED ON AN OBJECT OR ARTIFACT, SUCH AS A TOOL, A BOOK, OR A VEHICLE. THESE TEND TO BE MORE SPECIFIC THAN CONCEPTUAL MODELS BASED ON ACTIVITIES, FOCUSING ON THE WAY A PARTICULAR OBJECT IS USED IN A PARTICULAR CONTEXT. THEY ARE OFTEN BASED ON AN ANALOGY WITH SOMETHING IN THE PHYSICAL WORLD. AN EXAMPLE OF A HIGHLY SUCCESSFUL CONCEPTUAL MODEL BASED ON AN OBJECT IS THE SPREADSHEET (WINOGRAD, 1996).



THE OBJECT THIS IS BASED ON IS THE LEDGER SHEET. THE FIRST SPREADSHEET WAS DESIGNED BY DAN BRICKLIN, AND CALLED VISICALC. IT ENABLED PEOPLE TO CARRY OUT A RANGE OF TASKS THAT PREVIOUSLY COULD ONLY BE DONE VERY LABORIOUSLY AND WITH MUCH DIFFICULTY USING OTHER SOFTWARE PACKAGES, A CALCULATOR, OR BY HAND (SEE FIGURE 2.7). THE MAIN REASONS WHY THE SPREADSHEET HAS BECOME SO SUCCESSFUL ARE FIRST, THAT BRICKLIN UNDERSTOOD WHAT KIND OF TOOL WOULD BE USEFUL TO PEOPLE IN THE FINANCIAL WORLD (LIKE ACCOUNTANTS) AND SECOND, HE KNEW HOW TO DESIGN IT SO THAT IT COULD BE USED IN THE WAY THAT THESE PEOPLE WOULD FIND USEFUL. THUS, AT THE OUTSET, HE UNDERSTOOD

- THE KINDS OF ACTIVITIES INVOLVED IN THE FINANCIAL SIDE OF BUSINESS, AND
- THE PROBLEMS PEOPLE WERE HAVING WITH EXISTING TOOLS WHEN TRYING TO ACHIEVE THESE ACTIVITIES.

2.4 INTERFACE METAPHORS

ANOTHER WAY OF DESCRIBING CONCEPTUAL MODELS IS IN TERMS OF INTERFACE METAPHORS. BY THIS IS MEANT A CONCEPTUAL MODEL THAT HAS BEEN DEVELOPED TO BE SIMILAR IN SOME WAY TO ASPECTS OF A PHYSICAL ENTITY (OR ENTITIES) BUT THAT ALSO HAS ITS OWN BEHAVIORS AND PROPERTIES. SUCH MODELS CAN BE BASED ON AN ACTIVITY OR AN OBJECT OR BOTH. AS WELL AS BEING CATEGORIZED AS CONCEPTUAL MODELS BASED ON OBJECTS, THE DESKTOP AND THE SPREADSHEET ARE ALSO EXAMPLES OF INTERFACE METAPHORS.

- ANOTHER EXAMPLE OF AN INTERFACE METAPHOR IS A "SEARCH ENGINE." THE TOOL HAS BEEN DESIGNED TO INVITE COMPARISON WITH A PHYSICAL OBJECT-A MECHANICAL ENGINE WITH SEVERAL PARTS WORKING-TOGETHER WITH AN EVERYDAY ACTION-SEARCHING BY LOOKING THROUGH NUMEROUS FILES IN MANY DIFFERENT PLACES TO EXTRACT RELEVANT INFORMATION.
- INTERFACE METAPHORS ARE BASED ON CONCEPTUAL MODELS THAT COMBINE FAMILIAR KNOWLEDGE WITH NEW CONCEPTS. AS MENTIONED IN BOX 2.2, THE STAR WAS BASED ON A CONCEPTUAL MODEL OF THE FAMILIAR KNOWLEDGE OF AN OFFICE. PAPER, FOLDERS, FILING CABINETS, AND MAILBOXES WERE REPRESENTED AS ICONS ON THE SCREEN AND WERE DESIGNED TO POSSESS SOME OF THE PROPERTIES OF THEIR PHYSICAL COUNTERPARTS. DRAGGING A DOCUMENT ICON ACROSS THE DESKTOP SCREEN WAS SEEN AS EQUIVALENT TO PICKING UP A PIECE OF PAPER IN THE PHYSICAL WORLD AND MOVING IT (BUT OF COURSE IS A VERY DIFFERENT ACTION). SIMILARLY, DRAGGING AN ELECTRONIC DOCUMENT ONTO AN ELECTRONIC FOLDER WAS SEEN AS BEING ANALOGOUS TO PLACING A PHYSICAL DOCUMENT INTO A PHYSICAL CABINET. IN ADDITION, NEW CONCEPTS THAT WERE INCORPORATED AS PART OF THE DESKTOP METAPHOR WERE OPERATIONS THAT COULDN'T BE PERFORMED IN THE PHYSICAL WORLD. FOR EXAMPLE, ELECTRONIC FILES COULD BE PLACED ONTO AN ICON OF A PRINTER ON THE DESKTOP, RESULTING IN THE COMPUTER PRINTING THEM OUT.

2.4.1 BENEFITS OF INTERFACE METAPHORS

INTERFACE METAPHORS HAVE PROVEN TO BE HIGHLY SUCCESSFUL, PROVIDING USERS WITH A FAMILIAR ORIENTING DEVICE AND HELPING THEM UNDERSTAND AND LEARN HOW TO USE A SYSTEM. PEOPLE FIND IT EASIER TO LEARN AND TALK ABOUT WHAT THEY ARE DOING AT THE COMPUTER INTERFACE IN TERMS FAMILIAR TO THEM-WHETHER THEY ARE COMPUTER-PHOBIC OR HIGHLY EXPERIENCED PROGRAMMERS.

- **INTERACTION STYLES**

INTERACTION CAN BE SEEN AS A DIALOG BETWEEN THE COMPUTER AND THE USER. THE CHOICE OF INTERFACE STYLE CAN HAVE A PROFOUND EFFECT ON THE NATURE OF THIS DIALOG. HERE WE INTRODUCE THE MOST COMMON INTERFACE STYLES AND NOTE THE DIFFERENT EFFECTS THESE HAVE ON THE INTERACTION.

- THERE ARE A NUMBER OF COMMON INTERFACE STYLES INCLUDING:
- COMMAND LINE INTERFACE
- MENUS
- NATURAL LANGUAGE
- QUESTION/ANSWER AND QUERY DIALOG
- FORM-FILLS AND SPREADSHEETS
- WIMP
- POINT AND CLICK
- THREE-DIMENSIONAL INTERFACES.
- AS THE WIMP INTERFACE IS THE MOST COMMON AND COMPLEX, WE WILL DISCUSS EACH OF ITS ELEMENTS IN GREATER DETAIL IN SECTION 3.6.

1) COMMAND LINE INTERFACE: THE COMMAND LINE INTERFACE (FIGURE 3.7) WAS THE FIRST INTERACTIVE DIALOG STYLE TO BE COMMONLY USED AND, IN SPITE OF THE AVAILABILITY OF MENU-DRIVEN INTERFACES, IT IS STILL WIDELY USED. IT PROVIDES A MEANS OF EXPRESSING INSTRUCTIONS TO THE COMPUTER DIRECTLY, USING FUNCTION KEYS, SINGLE CHARACTERS, ABBREVIATIONS OR WHOLE-WORD COMMANDS.

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sable.soc.staffs.ac.uk> javac HelloWorldApp
javac: invalid argument: HelloWorldApp
use: javac [-g][-O][-classpath path][-d dir] file.java...
sable.soc.staffs.ac.uk> javac HelloWorldApp.java
sable.soc.staffs.ac.uk> java HelloWorldApp
Hello world!!
sable.soc.staffs.ac.uk>
```

FIGURE (2.2) COMMAND LINE INTERFACE

2) MENUS: IN A MENU-DRIVEN INTERFACE, THE SET OF OPTIONS AVAILABLE TO THE USER IS DISPLAYED ON THE SCREEN, AND SELECTED USING THE MOUSE, OR NUMERIC OR ALPHABETIC KEYS. SINCE THE OPTIONS ARE VISIBLE THEY ARE LESS DEMANDING OF THE USER, RELYING ON RECOGNITION RATHER THAN RECALL.

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PAYMENT DETAILS                                P3-7

please select payment method:
1. cash
2. check
3. credit card
4. invoice

9. abort transaction
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FIGURE (2.3) MENU – DRIVEN INTERFACE

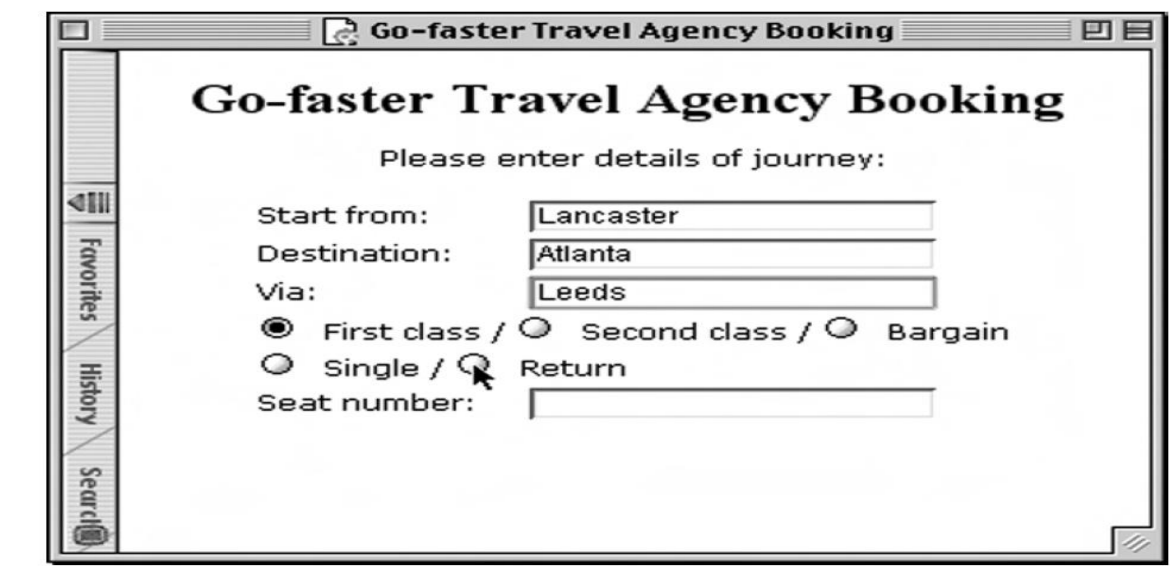
3) NATURAL LANGUAGE: PERHAPS THE MOST ATTRACTIVE MEANS OF COMMUNICATING WITH COMPUTERS, AT LEAST AT FIRST GLANCE, IS BY NATURAL LANGUAGE. USERS, UNABLE TO REMEMBER A COMMAND OR LOST IN A HIERARCHY OF MENUS, MAY LONG FOR THE COMPUTER THAT IS ABLE TO UNDERSTAND INSTRUCTIONS EXPRESSED IN EVERYDAY WORDS! NATURAL LANGUAGE UNDERSTANDING, BOTH OF SPEECH AND WRITTEN INPUT. UNFORTUNATELY, HOWEVER, THE AMBIGUITY OF NATURAL LANGUAGE MAKES IT VERY DIFFICULT FOR A MACHINE TO UNDERSTAND. LANGUAGE IS AMBIGUOUS AT A NUMBER OF LEVELS. FIRST, THE SYNTAX, OR STRUCTURE, OF A PHRASE MAY NOT BE CLEAR. IF WE ARE GIVEN THE SENTENCE

THE BOY HIT THE DOG WITH THE STICK

- WE CANNOT BE SURE WHETHER THE BOY IS USING THE STICK TO HIT THE DOG OR WHETHER THE DOG IS HOLDING THE STICK WHEN IT IS HIT. EVEN IF A SENTENCE'S STRUCTURE IS CLEAR, WE MAY FIND AMBIGUITY IN THE MEANING OF THE WORDS USED.
- GIVEN THESE PROBLEMS, IT SEEMS UNLIKELY THAT A GENERAL NATURAL LANGUAGE INTERFACE WILL BE AVAILABLE FOR SOME TIME. THE SYSTEM CAN BE PROVIDED WITH SUFFICIENT INFORMATION TO DISAMBIGUATE TERMS. IT IS IMPORTANT IN INTERFACES WHICH USE NATURAL LANGUAGE IN THIS RESTRICTED FORM THAT THE USER IS AWARE OF THE LIMITATIONS OF THE SYSTEM AND DOES NOT EXPECT TOO MUCH UNDERSTANDING.

4) QUESTION/ANSWER AND QUERY DIALOG: DIALOG IS A SIMPLE MECHANISM FOR PROVIDING INPUT TO AN APPLICATION IN A SPECIFIC DOMAIN. THE USER IS ASKED A SERIES OF QUESTIONS (MAINLY WITH YES/NO RESPONSES, MULTIPLE CHOICE, OR CODES) AND SO IS LED THROUGH THE INTERACTION STEP BY STEP. AN EXAMPLE OF THIS WOULD BE WEB QUESTIONNAIRES. THESE INTERFACES ARE EASY TO LEARN AND USE, BUT ARE LIMITED IN FUNCTIONALITY AND POWER. AS SUCH, THEY ARE APPROPRIATE FOR RESTRICTED DOMAINS (PARTICULARLY INFORMATION SYSTEMS) AND FOR NOVICE OR CASUAL USERS. QUERY LANGUAGES, ON THE OTHER HAND, ARE USED TO CONSTRUCT QUERIES TO RETRIEVE INFORMATION FROM A DATABASE. THEY USE NATURAL LANGUAGE-STYLE PHRASES, BUT IN FACT REQUIRE SPECIFIC SYNTAX, AS WELL AS KNOWLEDGE OF THE DATABASE STRUCTURE.

5) FORM-FILLS INTERFACES: ARE USED PRIMARILY FOR DATA ENTRY BUT CAN ALSO BE USEFUL IN DATA RETRIEVAL APPLICATIONS. THE USER IS PRESENTED WITH A DISPLAY RESEMBLING A PAPER FORM, WITH SLOTS TO FILL IN (SEE FIGURE 3.9). OFTEN THE FORM DISPLAY IS BASED UPON AN ACTUAL FORM WITH WHICH THE USER IS FAMILIAR, WHICH MAKES THE INTERFACE EASIER TO USE. THE USER WORKS THROUGH THE FORM, FILLING IN APPROPRIATE VALUES. THE DATA ARE THEN ENTERED INTO THE APPLICATION IN THE CORRECT PLACE.



The screenshot shows a web browser window titled "Go-faster Travel Agency Booking". Inside the window, the title "Go-faster Travel Agency Booking" is displayed in a large, bold, serif font. Below the title, the text "Please enter details of journey:" is centered. The form contains several input fields and radio buttons. On the left side of the form, there is a vertical sidebar with three buttons: "Favorites", "History", and "Search". The main form fields are: "Start from:" with a text box containing "Lancaster"; "Destination:" with a text box containing "Atlanta"; "Via:" with a text box containing "Leeds"; a row of three radio buttons labeled "First class /", "Second class /", and "Bargain", with the first one selected; a row of two radio buttons labeled "Single /" and "Return", with the second one selected and a mouse cursor hovering over it; and "Seat number:" with an empty text box.

FIGURE (2.4) A TYPICAL FORM- FILLING INTERFACE. SCREEN SHOT FRAME REPRINTED BY PERMISSION FROM MICROSOFT CORPORATION

6) THE WIMP INTERFACE : CURRENTLY MANY COMMON ENVIRONMENTS FOR INTERACTIVE COMPUTING ARE EXAMPLES OF THE WIMP INTERFACE STYLE, OFTEN SIMPLY CALLED WINDOWING SYSTEMS. WIMP STANDS FOR WINDOWS, ICONS, MENUS AND POINTERS (SOMETIMES WINDOWS, ICONS, MICE AND PULL-DOWN MENUS), AND IS THE DEFAULT INTERFACE STYLE FOR THE MAJORITY OF INTERACTIVE COMPUTER SYSTEMS IN USE TODAY, ESPECIALLY IN THE PC AND DESKTOP WORKSTATION ARENA. EXAMPLES OF WIMP INTERFACES INCLUDE MICROSOFT WINDOWS FOR IBM PC COMPATIBLES, MACOS FOR APPLE MACINTOSH COMPATIBLES AND VARIOUS X WINDOWS-BASED SYSTEMS FOR UNIX.

7) POINT-AND-CLICK INTERFACES: IN MOST MULTIMEDIA SYSTEMS AND IN WEB BROWSERS, VIRTUALLY ALL ACTIONS TAKE ONLY A SINGLE CLICK OF THE MOUSE BUTTON. YOU MAY POINT AT A CITY ON A MAP AND WHEN YOU CLICK A WINDOW OPENS, SHOWING YOU TOURIST INFORMATION ABOUT THE CITY. YOU MAY POINT AT A WORD IN SOME TEXT AND WHEN YOU CLICK YOU SEE A DEFINITION OF THE WORD. YOU MAY POINT AT A RECOGNIZABLE ICONIC BUTTON AND WHEN YOU CLICK SOME ACTION IS PERFORMED.

8) THREE-DIMENSIONAL INTERFACES : THERE IS AN INCREASING USE OF THREE-DIMENSIONAL EFFECTS IN USER INTERFACES. THE MOST OBVIOUS EXAMPLE IS VIRTUAL REALITY, BUT VR IS ONLY PART OF A RANGE OF 3D TECHNIQUES AVAILABLE TO THE INTERFACE DESIGNER.

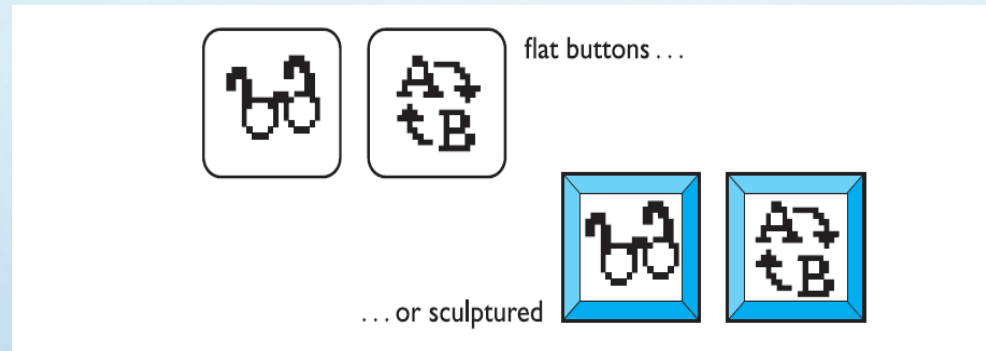


FIGURE 2.5 BUTTONS IN 3D SAY “PRESS ME”

NOVICE USERS MUST LEARN THAT AN OVAL AREA WITH A WORD OR PICTURE IN IT IS A BUTTON TO BE PRESSED, BUT A 3D BUTTON SAYS ‘PUSH ME’. FURTHER, MORE COMPLETE 3D ENVIRONMENTS INVITE ONE TO MOVE WITHIN THE VIRTUAL ENVIRONMENT, RATHER THAN WATCH AS A SPECTATOR.