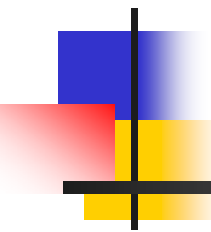


Web Browsing Behaviour: Towards an Effective Website Design



By

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Agenda

- Motivation
- Literature Review – Human Wayfinding
- Study 1: Exploration of Wayfinding on Website Environment
- Study 2: Application of Wayfinding Theory



Motivation

- Websites should be effectively designed to help users in finding what they want.
- However, poor Website design still exists:
 - “lostness” or disorientation,
 - dissatisfaction,
 - poor user performance,
 - and leave Website → possible loss of online sales

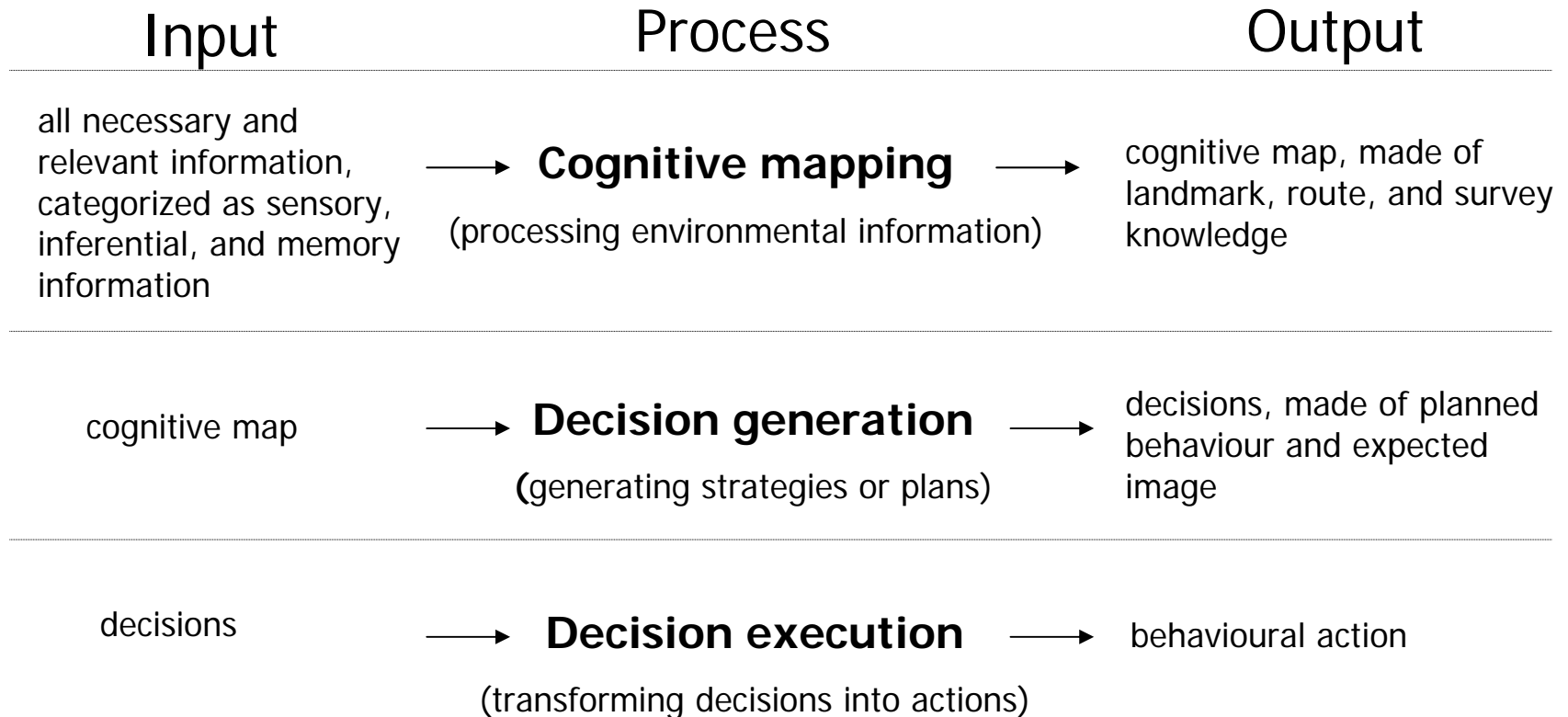


Literature Review – Human Wayfinding

- We need to understand user behaviour and his navigation in a Website in order to derive a truly effective Website design.
- We posit using wayfinding theory (the process of people successfully finding their way to the destinations in the real environment) to understand user behaviour and match it in accomplishing tasks.

Literature Review – Human Wayfinding

- Wayfinding Processes:

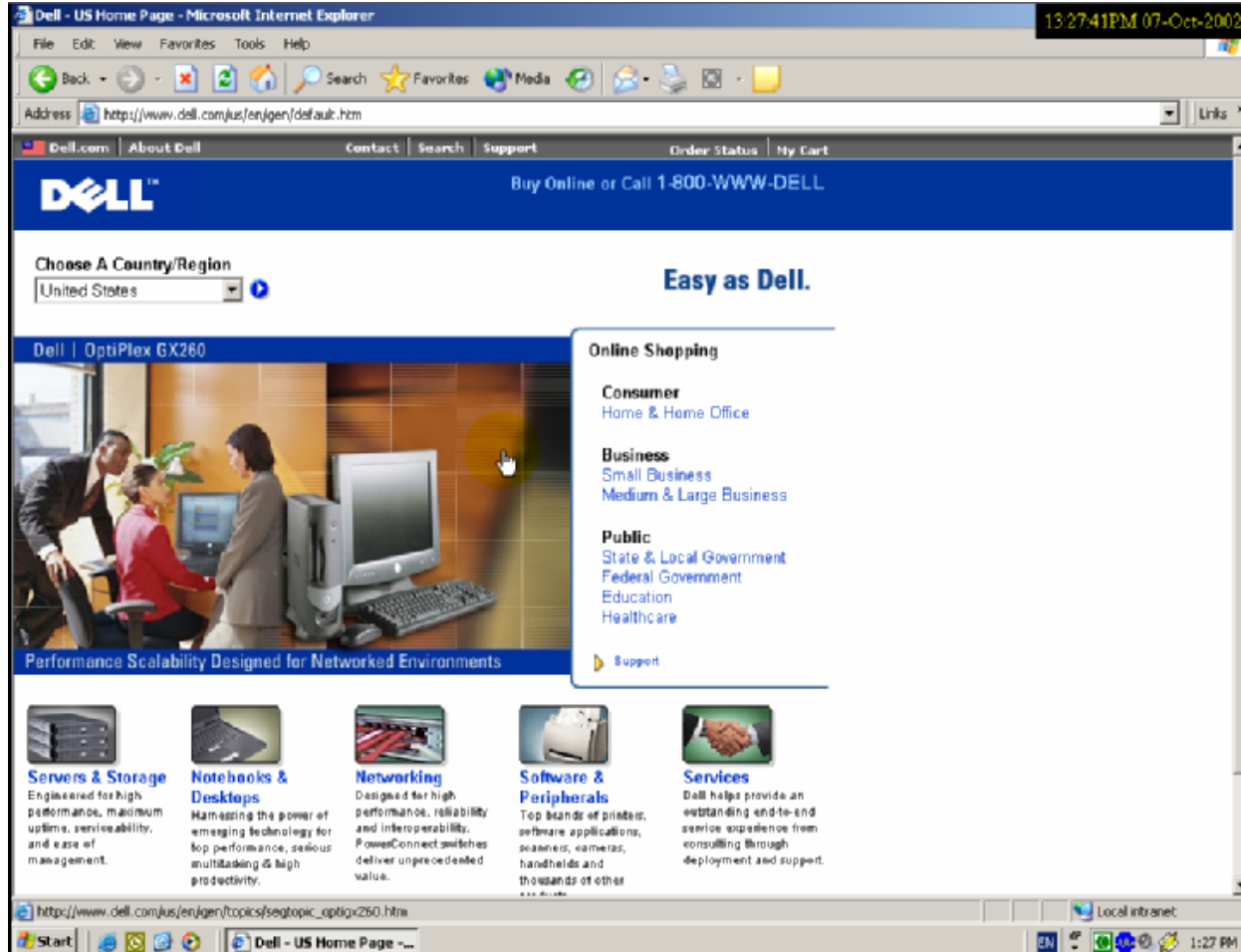




Study 1 – Exploration of Wayfinding on Website Environment

- Investigate through case study method
 - In-depth examination of user behaviour required to explain how and why certain features would affect user's navigation and experience in Website
- Website environments:
 - The website used was Dell's Website.

Study 1 – Case background



Dell's Website (<http://www.dell.com>)



Study 1 – Methodology

- Subjects:
 - 3 males and 3 females
 - Average age – 22 yrs old
 - Subjects comfortable with and skilful using Internet
- Assigned task:
 - To make an online purchase of either a desktop or notebook computer



Study 1 – Methodology

- Procedures:
 - To answer pre-interview survey
 - To perform a short warm-up exercise in verbalizing aloud
 - To complete assigned task in Dell's Website
 - Subjects to ***think aloud*** their thoughts and actions
 - Movements on monitor screen and voices of subjects captured using Camtasia Studio software
 - To answer post-interview survey
 - Open-ended discussion on subjects' experience



Study 1 – Data Collection

- Cognitive mapping – drawings of Website envts
 - Accuracy of drawings based on
 - Webpage level – identification & placement of main features
 - Website level – approximate depth & breadth of structure
- Decision generation – decision diagram stating hierarchy of decisions made
 - No. of decisions made, strategies used, avg. time spent in making a decision
- Decision execution – behavioural action taken
 - No. of decisions executed successfully/unsuccessfully



Study 1: Results

- Cognitive map
 - Comments from subjects also showed that they were performing cognitive mapping while exploring Websites, *“hmm... this is definitely not what I’ve expected ...”, “I think I can find the catalogue in this laptop hyperlink”*
 - Analysis of pre-interview drawings:
 - Drawings of Dell’s Website matched reasonably with actual one. Possibly because subjects had visited other Websites selling computer hardware
 - Analysis of post-interview drawings:
 - Drawings of Dell Website matched closer to the actual ones

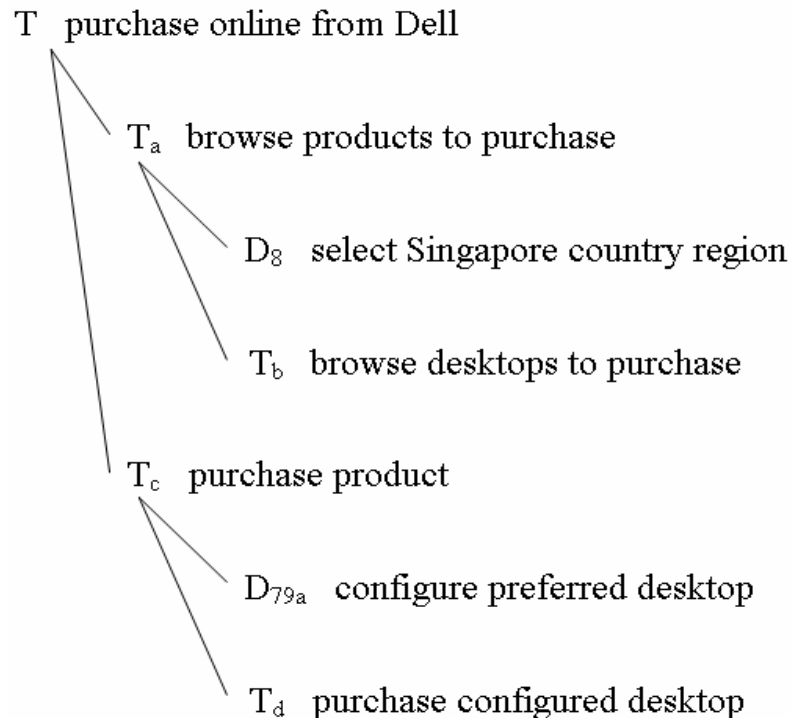


Study 1: Results

- The subjects visualized correctly majority of the landmarks and their placements for Dell's homepage, like the company logo, navigation bar, product catalogue, and content area.
- They could also visualize that Dell's Website has a deep structure.

Study 1: Results

- Decision generation: Assigned task broken down to form subtasks and individual decisions



Subject C's decision hierarchy in Dell's Website.



Study 1: Results

- Decision execution
 - Decisions **executed** observed through clicking of hyperlinks and revealing of another Webpage
 - Decisions **unexecuted** looped back to form subtasks, e.g. subjects figuring how to compare different computer models in Dell's Website
- Decision generation and decision execution processes similar in both virtual Website and real envts



Study 1 – Discussion

Wayfinding in Website envt is similar to wayfinding in real envt.



Study 1 – Discussion

- **The meaning conveyed or implied by the Website content**
 - The subjects perceived Dell's Website content to be accessible – *"I think I can find the product warranty in this table", "the product I want should be in here"*.
 - subjects could form the landmarks in their cognitive maps quickly and generate decisions quickly to identify which landmark to focus on and know exactly where to find it
 - The good quality of information reduces the cognitive overhead in forming cognitive maps.



Study 1 – Discussion

- **The appearance or outward forms of the Website**
 - The consistency of design and compliance with the general Web conventions helped subjects to form the landmarks in their cognitive maps quickly and generate decisions quickly to identify which landmark to focus on and know exactly where to find it - *“I’m focusing on this area because I know that the description is in here”, “Dell definitely follows the normal Web conventions”, “everything looks pretty much the same as in any commercial Websites”.*



Study 1 – Discussion

- A few subjects had noted that they *“know where to go”* without wasting their *“time trying to figure (their) way around the Website”* as the presentation of the information in the Dell’s Website was *“more predictable”*.
- the high legibility of the Website helped the subjects to extract even more information to form a proper cognitive map as well as to assess decisions to execute - *“this is quite easy to read”, “I’m glad I don’t have to highlight the text to read it”*.



Study 1 – Discussion

- **The structure and navigation of a Website**
 - In navigating Dell's Website, the subjects did not find it difficult as there were several navigation aids that allowed them to easily search for information.
 - Dell's Website had well-labelled hyperlinks that enabled subjects to orientate themselves and predict the content underlying it - *"(hyper) links link to the pages (they) expect"* and *"novices will find it easy to navigate as they did not need to interpret the meaning of the cues"*.
 - One subject clicked it to see the organization of Dell's Website, *"I like to check out the sitemap and it will tell me the organization of the Website."*



Study 2: Impact of Various Website Design Dimensions on User Performance

- Objective: Investigate impact of high degree of each design dimension in study 1 on user performance through experimentation
- User performance measured by:
 - Effectiveness
 - Efficiency
 - Satisfaction



Study 2: Literature Review

- Focus of research is on effective Website design, categorized into 3 design dimensions:
 - *Purport* – **The meaning conveyed or implied by the Website content**
 - *Semblance* – **The appearance or outward forms of the Website**
 - *Morphology* – **The structure and navigation of a Website**



Literature Review

- Purport dimension:
 - Katerattanakul and Siau (1999) measured information quality of Websites: context important towards user's comprehension
 - Relevant information important in building user's cognitive map (Johnson-Laird, 1989)



Literature Review

- Semblance dimension:
 - Graphical Website increases satisfaction (Zhang et al, 1999), while a well-presented one improves navigation (Zhang et al, 2000)
 - Webpage design should be consistent, as an inconsistent one places cognitive burden on user (Huizingh, 2000)



Literature Review

- Morphology dimension:
 - Lynch (1995) highlighted that Website hierarchy should be well-structured to users
 - Larson and Czerwinski (1998) showed that user performance is optimal when structure of Website is at a moderate level of 16x32. In addition, users should have good overview of Website
 - Lastly, Website can have more depth and small Webpages to yield positive user perceptions (Kim et al, 2002)

Study 2 – Research Model

Independent Variables

Purport

- *Relevancy of information*
- *Timeliness of information*

Semblance

- *Consistency of interface design*
- *Consistency with general Web conventions*

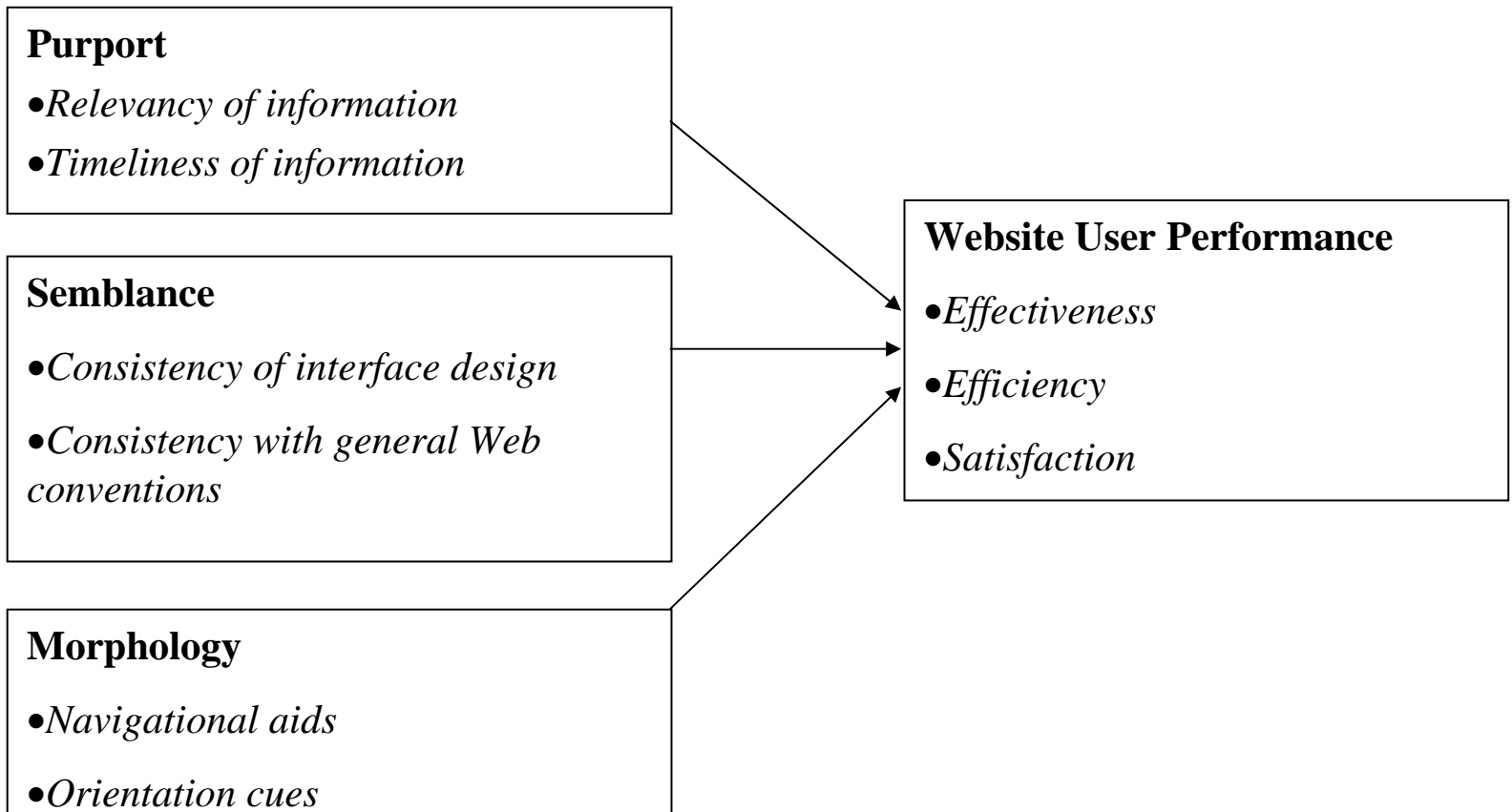
Morphology

- *Navigational aids*
- *Orientation cues*

Dependent Variable

Website User Performance

- *Effectiveness*
- *Efficiency*
- *Satisfaction*





Study 2 – Methodology

- Investigate research model using a 3 by 2 factorial design through controlled laboratory experiment
- 3 by 2 factorial design
 - Design dimensions as independent variables
 - 3 design dimensions, each having 2 degrees (high, low) = 8 treatments
- Dependent Variables
 - Effectiveness: accuracy of tasks (right/wrong)
 - Efficiency and satisfaction: questionnaires (7-point Likert scale)

Study 2 – Experiment Results

Variables	Purport – High				Purport – Low			
	Semblance – High		Semblance – Low		Semblance – High		Semblance – Low	
	Morph – High	Morph – Low	Morph – High	Morph – Low	Morph – High	Morph – Low	Morph – High	Morph – Low
Effectiveness	1.889 (0.323)	1.389 (0.502)	1.222 (0.428)	1.222 (0.428)	1.667 (0.485)	2.000 (0.000)	1.444 (0.616)	1.722 (0.461)
Efficiency	5.926 (0.797)	4.259 (1.082)	4.63 (1.209)	3.556 (1.353)	5.389 (1.190)	3.722 (1.049)	4.852 (1.139)	3.889 (1.143)
Satisfaction	5.278 (1.100)	3.578 (1.156)	3.756 (0.947)	3.356 (1.149)	4.544 (0.977)	3.089 (1.146)	3.411 (1.405)	3.256 (1.060)

Table 13. Descriptive statistics for dependent constructs.



Study 2 – Experiment Results

- Summary of Hypotheses tests

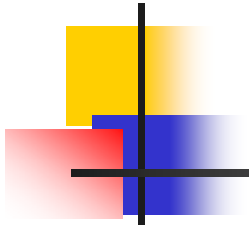
Dimension/ User Performance	Effectiveness	Efficiency	Satisfaction
Purport	not supported	not supported	supported
Semblance	supported	supported	supported
Morphology	not supported	supported	supported



Discussion

- Overall Conclusion

- Viable to adopt wayfinding theory in understanding user behaviour so as to improve design of Website
- Wayfinding protocol analysis represents a means to focus into cognitive thoughts of a user and how he interprets the design
- More research can be done on wayfinding theory and its processes



Thank You!



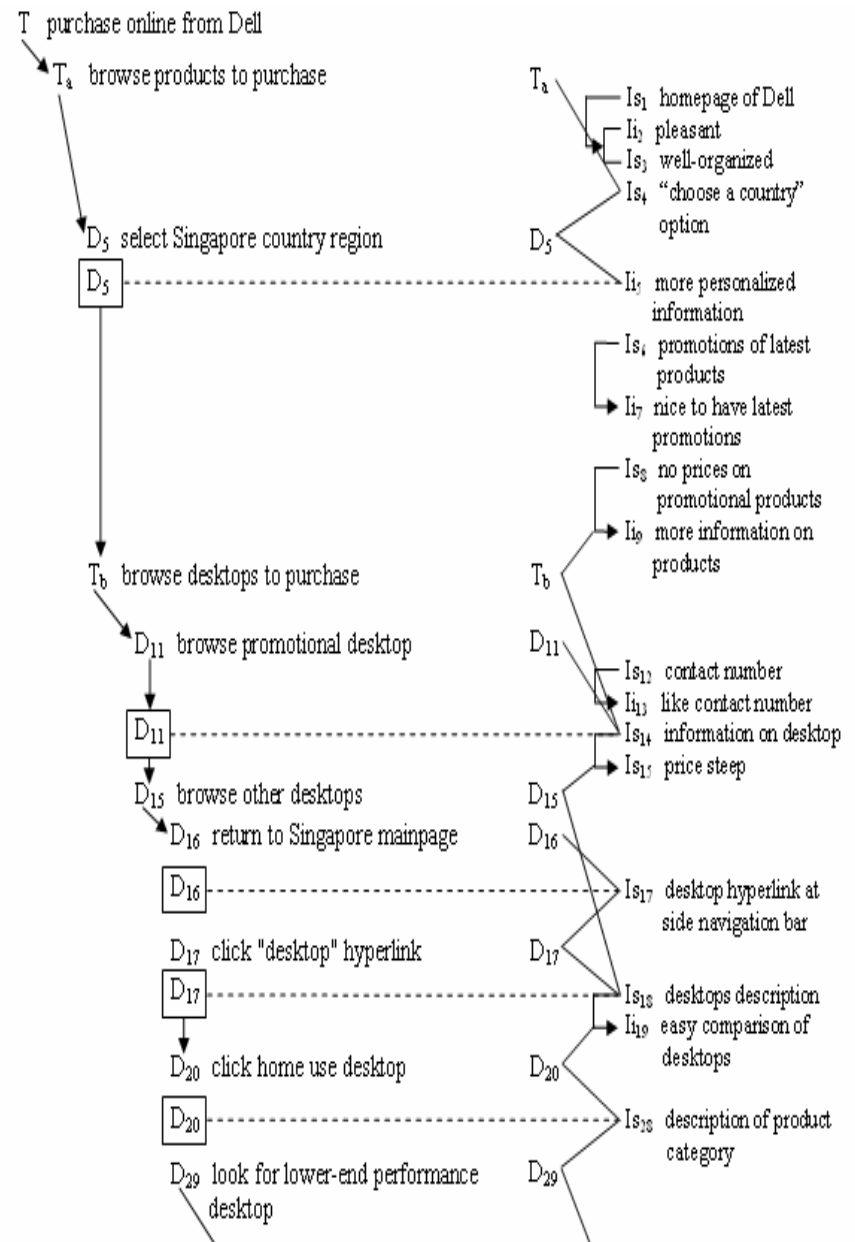
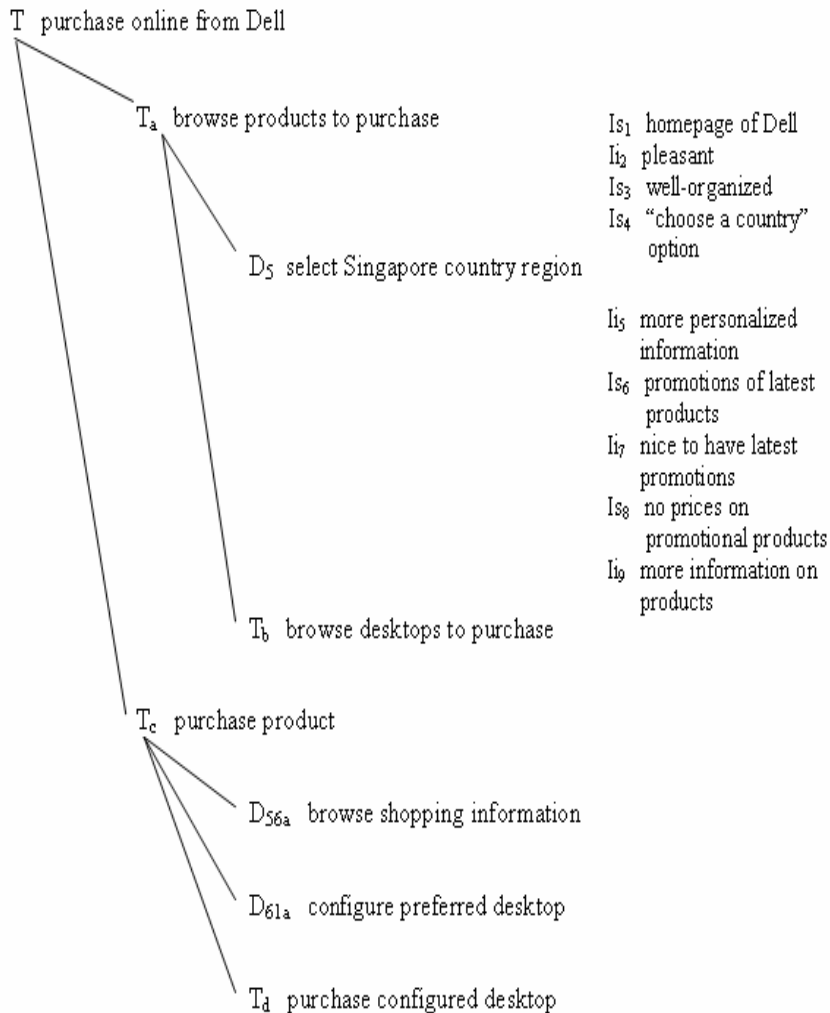
Study 1 – Methodology

- Data analysis:
 - Observations coded using wayfinding protocol, developed by Passini (1984). Basic units:
 - **Decision (D)** – intended or actual behavioural action
 - **Task (T)** – decision contained in task description
 - **Sensory information (Is)** – statements of origin and content displayed on Website
 - **Memory information (Im)** – statements of particular or general knowledge of user
 - **Inferential information (Ii)** – combination of **Is** and **Im**



Study 1: Results

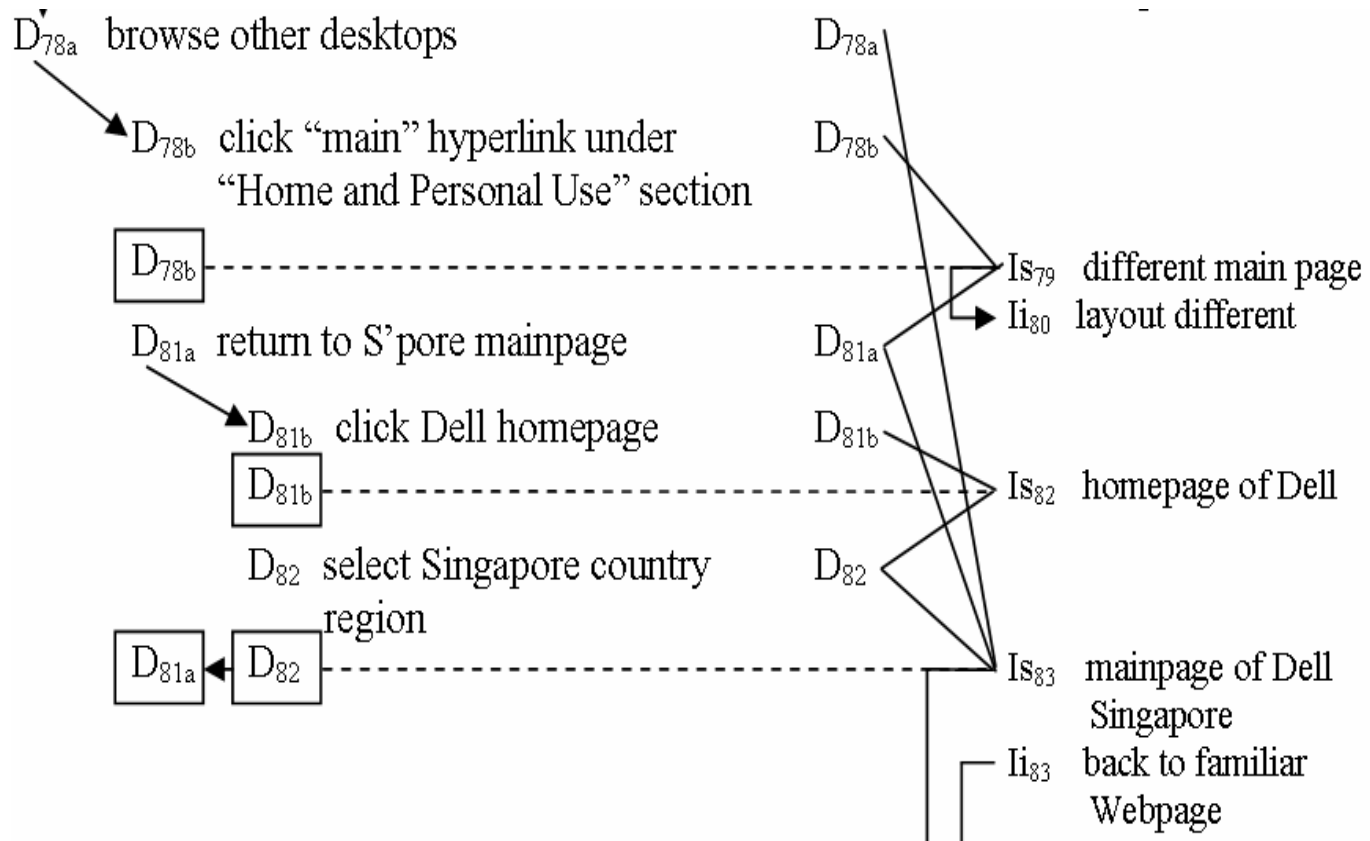
- Cognitive mapping
 - Environmental information
 - Most observed – sensory information (*Is*), least – memory information (*Im*)
 - *Is*: “I see three types of Dimension desktop” , “Quick menu bar...”
 - *Ii*: “this is a simple and nice homepage design”, “This Webpage is an order form?”
 - *Im*: “this looks like other commercial Websites”, “I remember there’s a laptop section somewhere...”



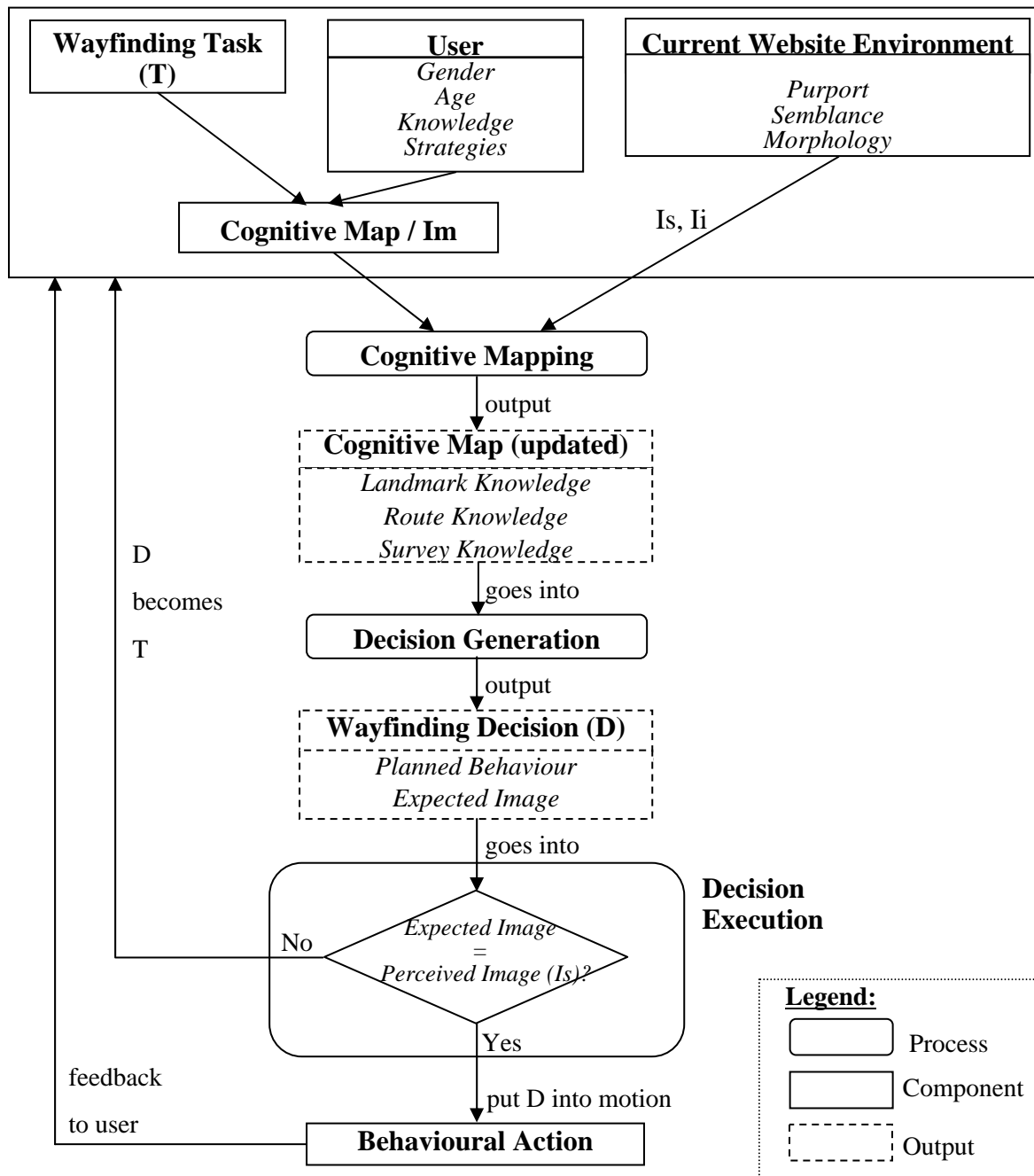
Decision structure diagram of Subject B

Decision sequence diagram of Subject B

Study 1 – Discussion



Subject C assessing Dell homepage and Dell-Singapore mainpage.



The flow diagram of the browsing behaviour