



THE UNIVERSITY OF MELBOURNE

Granularity in Route Directions Generated by Systems and Humans



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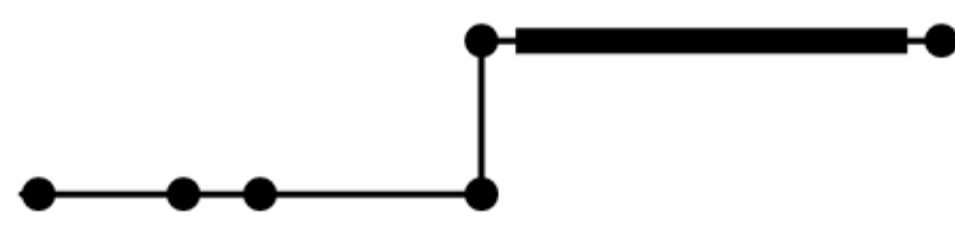
In a nutshell:

- How detailed should a route description be?
 - Does the wayfinder need path information or does information about the target location suffice?
 - Does the wayfinder need information about each decision point?
 - How much and what types of information does the wayfinder need about a particular region or segment of the route?
- Do automatically generated route descriptions correspond to human ones?
 - What types of information detail does each of them capture?
 - Does this information correspond to the actual information needs?

A model of spatial granularity

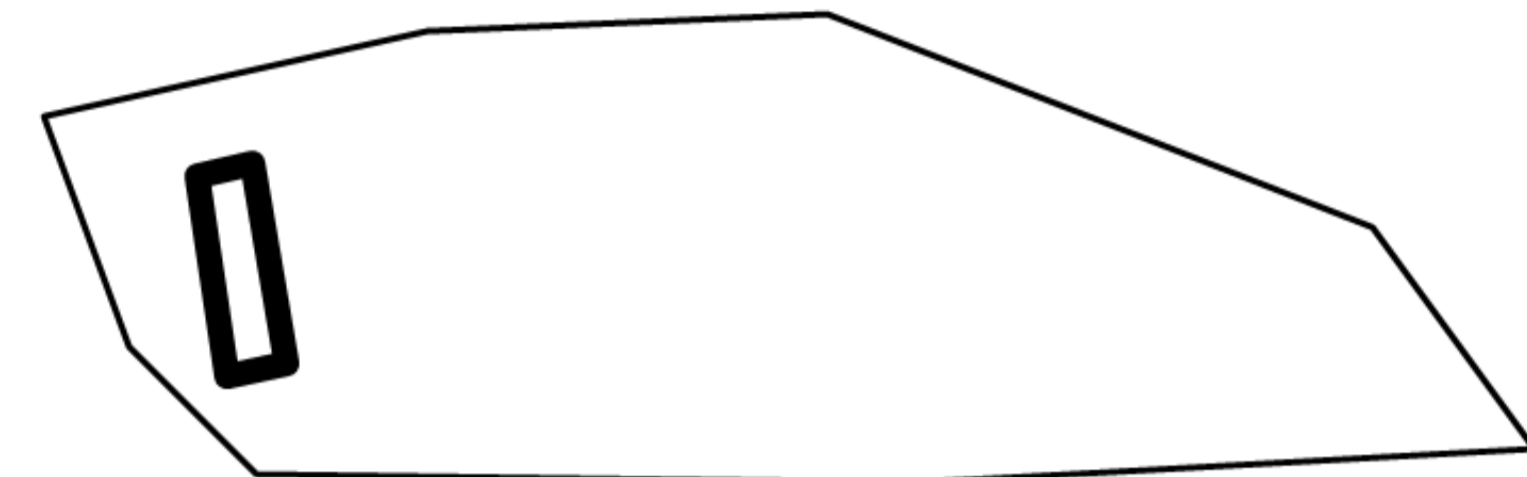
1D granularity

- The level of detail of describing the (linear) route
 - basic level: one instruction per decision point
 - chunking: combining several instructions
 - "turn right at the third intersection"
 - "follow the river"
- Switching 1D granularity means cutting up a segment into smaller ones – or grouping segments



2D granularity

- The level of detail of describing a region
 - zooming into or out of a region by referring to smaller or larger areas
 - destination descriptions switch 2D granularity
 - "The goal is in the central business district, close to the city hall"

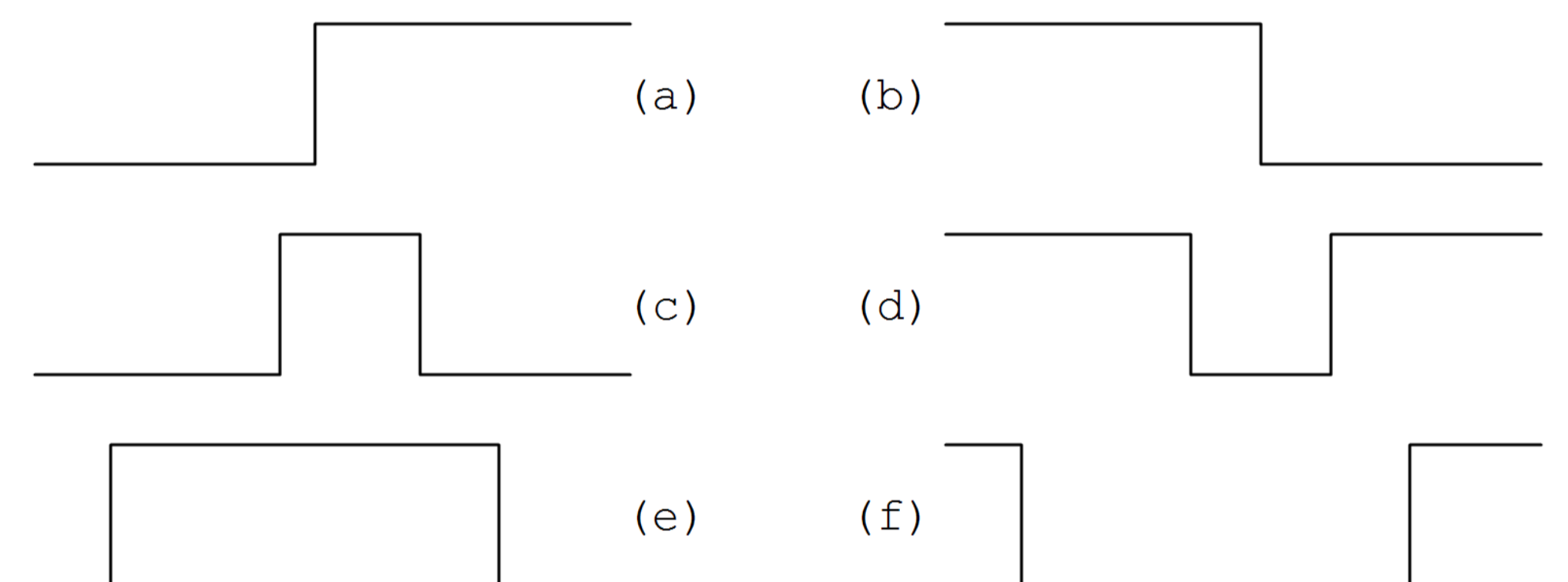


Reinforcement

- There are many ways of referring to entities: "the main road", "King Street", "the road leading downtown"
- Further info reinforces the reference: "follow the road for 200 meters", "you will see three traffic lights"
- Variation of the amount of information given: by more than one type of reference, and by adding further aspects
- Basic level: Reference to an entity by its basic level term ("the street")
- Switching to more detail involves referring to and describing the spatial region or segment in further ways
 - without necessarily changing the levels of 1D or 2D granularity

Switching granularity levels

- Both types of spatial granularity, and reinforcement, can be switched and combined freely in a route description
 - "take the tram to the station, in the station walk to the display board of departures and find the track information, follow the signs to the track, and then take the train to Bremen"



Case study: Travelling from the Cartesium (Bremen) to Ganderkesee high school by public transport

Shared results (in comparison to a certain wayfinder's actual information needs in a given scenario)

- Both types of route directions provide the most important pieces of information on distinct levels of granularity: a clear hierarchical structure
 - switches of 1D & 2D granularity as well as reinforcement co-occur with switches of travel mode

Web-based services (here: bahn.de)

- are by default mono-modal: focus on info about trains & buses
 - switches of modality involve further action by the user
- provide a range of alternatives concerning public transport
 - without information about relevance
- lack flexibility in 2D granularity
 - regions are categories of a provider ontology
 - may not correspond to the user's knowledge and information needs

Human (verbal) route directions (here: a small corpus of written data)

- are flexible with respect to 2D granularity
 - the descriptions zoom into and out of regions in a coherent way
- account for differences by direction of travelling
- account for differences by estimated information needs
 - by shifts to finer granularity levels and reinforcement where appropriate

Bahnhof/Haltestelle	Datum	Zeit	Gleis	Produkte	Bemerkungen
Bremen - Horn-Lehe, Enrique-Schmidt-Straße, Universität NW1, Bremen	Mi, 12.12.07			➤ Fußweg	5 Min.
Universität NW1, Bremen	Mi, 12.12.07	ab 14:02		Bus 670	Bus Richtung: Bremen Hauptbahnhof
Hauptbahnhof/ZOB Gleis 1, Bremen	Mi, 12.12.07	an 14:10			
Hauptbahnhof/ZOB Gleis 1, Bremen Hbf	Mi, 12.12.07			➤ Fußweg	11 Min.
Bremen Hbf	Mi, 12.12.07	ab 14:20	2	NWB81374	NordWestBahn Fahradmitnahme reservierungspflichtig, Fahrradmitnahme begrenzt möglich, Fahrradmitnahme-Anmeldung unter 01805 - 600 161*, (*14 ct/Min. aus dem dt. Festnetz via Arcor, Mobilfunk ggf. abweichend), NordWestBahn
Ganderkesee	Mi, 12.12.07	an 14:42			
Ganderkesee	Mi, 12.12.07			➤ Fußweg	11 Min.

von Ganderkesee nach Ganderkesee, Am Steinacker 12

	Zeit (Gesamt/Abschnitt)	Strecke (Gesamt/Abschnitt)	Anweisung/Richtung
1	14:42	0 km (24 m)	Ganderkesee
2	14:42 (1 Min.)	0,0 km (159 m)	links abbiegen auf Wittekindstraße
3	14:44 (2 Min.)	0,2 km (225 m)	links abbiegen auf Gruppenbühere Straße/B212
4	14:46 (2 Min.)	0,4 km (175 m)	halb links abbiegen auf Am Steinacker
5	14:49	0,6 km	Ganderkesee, Am Steinacker 12

Bahnhof/Haltestelle	Karte	Datum	Zeit	Dauer	Umst.	Produkte	Preis	Rückfahrt
Universität NW1, Bremen	➤ Fußweg	Mi, 12.12.07	ab 14:02	0:56	1	BUS, NWB	Normalpreis	Verbindung liegt in der Vergangenheit → hinzufügen
Ganderkesee	➤ Fußweg	Mi, 12.12.07	an 14:45					