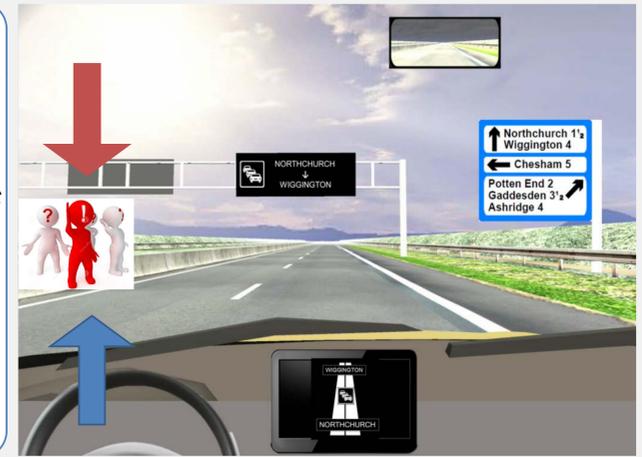


Locating variable events on electronic traffic signs: adapting the fixed formats

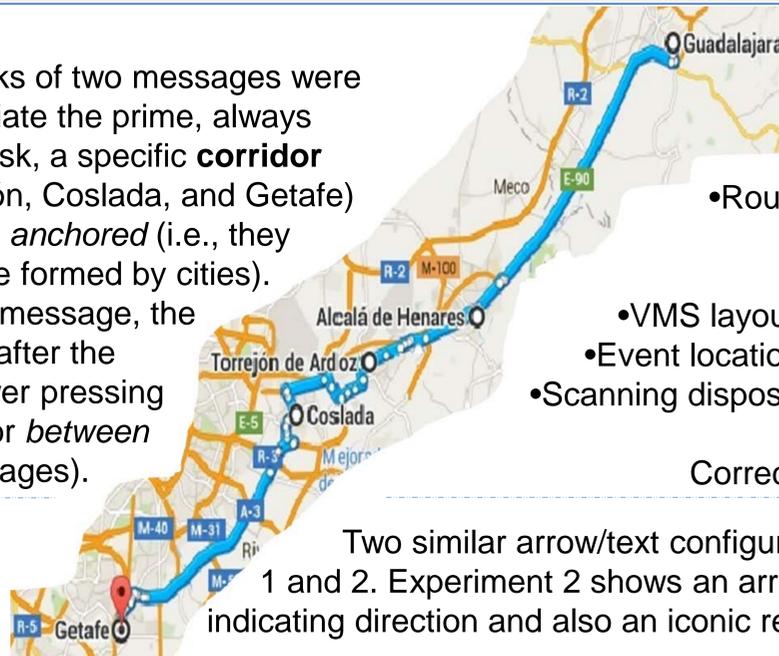
Introduction and problem

What design rationale is appropriate for the coming electronic signs? Two studies check the 1968 Convention's G,1^c template (Fig. 1). G,1^c locate places or events in advance by stacking them on the panel top to bottom (*what I read first, up, comes first*). This is confronted with two designs following the opposite rationale (*what is placed above, comes second*) in two complementary studies. Both models (normal vs inverted G,1^c) are transposed to standard VMS (one graphical part and three text lines; Ellenberg & Fabre, 1995). The first study keeps the information in all designs forming two columns (centered). The second study keep it close together (justified to left). We expect this simple change will enhance the interpretation of inverted G,1^c as a "arrow-diagram" (Kurata & Egenhofer, 2005), worsening the interpretation of normal G,1^c.



Method

Following the priming experimental paradigm, blocks of two messages were presented at random. Participants were told to obviate the prime, always answering with regards to the probe. Prior to the task, a specific **corridor** of 5 cities (Guadalajara –origin- then Alcalá, Torrejón, Coslada, and Getafe) was shown to them. Then, half of participants were *anchored* (i.e., they were immediately required to indicate the sequence formed by cities). Their main task was to indicate if, according to the message, the event (congestion, road works) was placed before/after the cities shown. They always had two options to answer pressing the keyboard (before city A or B / after city A or B for *between* messages; before/after city X for *before/after* messages).



A mixed model design

- IV: *Between-subjects factor:*
 - Route anchor (present vs absent)
- Within-subject factors:*
 - Prime (present vs control)
 - VMS layout (full matrix vs hybrid matrix)
 - Event location (before, between and after)
 - Scanning disposition (top-down vs bottom-up)
- DV: Correct answers and time response

Experiment 1 vs Experiment 2

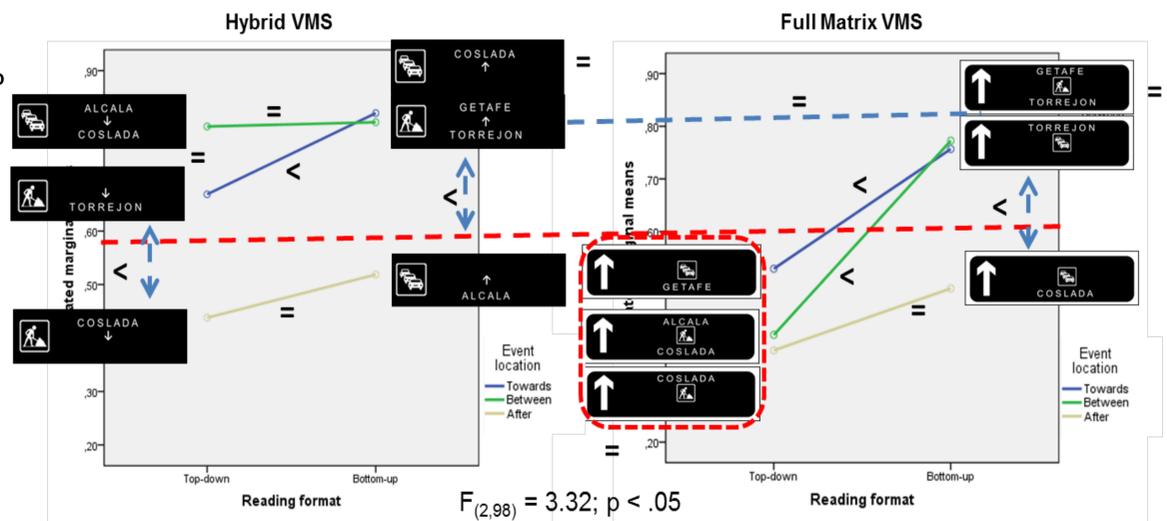


Two similar arrow/text configurations are compared in Study 1 and 2. Experiment 2 shows an arrow-diagram: here the arrow is indicating direction and also an iconic representation of the road itself

Experiment 1

Sample: N = 50 drivers; Age: M=28.2; SD = 9.55; 48%

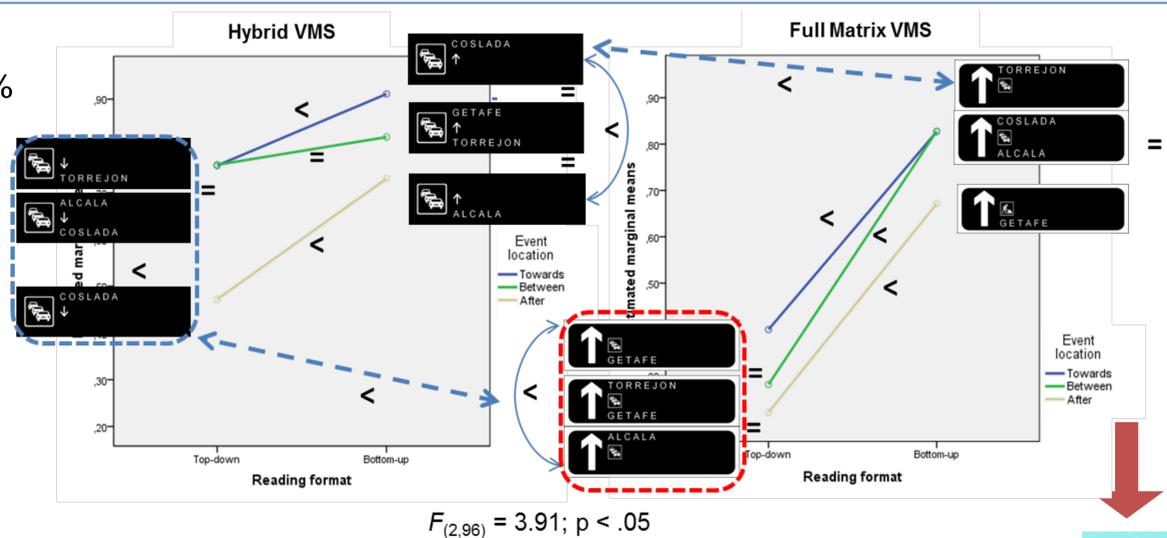
- Bottom-up dispositions yield more correct answers. Reading format $F_{(1,48)} = 21.2$; $p < .001$, $\eta_p^2 = 0.301$.
- Hybrid VMS layouts yield more correct answers. Matrix type $F_{(1,48)} = 20.9$; $p < .001$, $\eta_p^2 = 0.303$.
- When reading bottom-up the differences between matrix type are not so acute as when reading top-down. Reading format x matrix type interaction $F_{(1,48)} = 10.7$; $p < .01$, $\eta_p^2 = 0.182$.
- Locating an event *after* a city is the most difficult task. Event location $F_{(2,96)} = 19.2$; $p < .001$, $\eta_p^2 = 0.285$.



Experiment 2

Sample: N= 50 drivers; Age: M= 25.5; SD= 6.33; 54%

- Bottom-up dispositions yield more correct answers. Reading format $F_{(1,48)} = 99.4$; $p < .001$, $\eta_p^2 = 0.674$.
- Hybrid VMS layouts yield more correct answers. Matrix type $F_{(1,48)} = 47.94$; $p < .001$, $\eta_p^2 = 0.500$.
- Following previous results...significant differences between matrix type are found when reading top-down. Reading format x matrix type: interaction $F_{(1,48)} = 29.19$; $p < .001$, $\eta_p^2 = 0.378$.
- Locating an event *after* a city still remains difficult, but significantly better now for bottom-up designs. Event location $F_{(2,96)} = 10.59$; $p < .001$, $\eta_p^2 = 0.181$.



Conclusions

- Official 1968 Convention G,1^c templates (Advance Direction Signs) mix poorly with pictograms when stacked with text. Bottom-up arrow-diagrams, and in general bottom-up displays do it better.
- Hybrid VMS are not so diagrammatic, but present good comprehension levels. The participation of verbal structures (syntax) and inference mechanisms based on general knowledge (road signing schemes) should be better understood.
- Locating the events after city is particularly difficult, yielding poor comprehension levels.

