

When emotions disturb the localization of road elements: effects of anger and sadness

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INTRODUCTION: Visual search

- ✓ Interaction between incoming perceptual information (bottom-up) and higher level memory representations (top-down) known as schemata (Bartlett, 1932).
- ✓ These schemata are a prototypical representation of traffic environments which contain information regarding the typical spatial relationship between the road elements and road users (Theeuwes & Godthelp, 1995).
- ✓ Visual search of road elements can be guided by driving schemata (Theeuwes, 2004) → goal driven, expectations



INTRODUCTION : Attention and Emotions

- ✓ Perceptual and cognitive processes engaged in driving can be affected by many factors like emotions (Lemercier & Cellier, 2008).
- ✓ Negative moods can lead to decrease attentional resources capacity.
- ✓ Some attentional resources that would normally be used to perform the task are impacted by these internal, irrelevant thoughts in depression or negative moods such as sadness (Ellis & Moore, 1999).
- ✓ Spatial information processing (localization of road signs to warn about hazardous situations) is altered by inattention provoked by negative (irrelevant) thoughts during sadness (Pêcher et al., 2011).



INTRODUCTION: Emotions

- ✓ Anger and sadness have distinct effects on information processing (Storbeck, & Clore, 2008).
- ✓ Sadness is thought to promote the use of a detail-oriented processing of information (e.g., Bless, et al., 1996; Krauth-Gruber & Ric, 2006).
- ✓ Anger: relying more on general knowledge (schemata), using heuristics
➔ these information processing are more consistent with those pertaining to positive mood (Lerner & Tiedens, 2006).
- ✓ Angry drivers drive more like happy drivers than sad drivers (Pêcher, Lemerancier, & Cellier, 2009)



Objectives

- ➔ To study the effects of negative moods (sadness and anger) on the visual search of road elements (e.g., road signs, road users)
- ➔ To test the differences between anger and sadness: do these emotions lead to inattention?



Participants

→ 58 participants involved :

- ✓ Age : $M = 25.3$, $sd = 5.03$
- ✓ Driving at least 10.000 km/year
- ✓ Have at least their driving license since 3 years
- ✓ 20 induced in Sadness
- ✓ 19 induced in Anger
- ✓ 19 induced in Neutral Mood



Method

- ✓ Two steps experiment: **Mood Induction** then **Localization of targets**
- ✓ Mood Induction Procedure: music + guided imagery (Mayer et al., 1995)
- ✓ 3 measures of the effectiveness of the MIP (before, after induction and after the experimental task)
- ✓ Pictures of intersections (divided in 9 sections) contained at least:
 - ➔ one car, one pedestrian (Road Users group)
 - ➔ one traffic light, one road marking (Road Signs group)
- ✓ Participants had to localize one target as quickly as possible
- ✓ Three conditions of presentation: Original, Partly and Fully (Biederman, 1972; Chapman, et al., 2002)



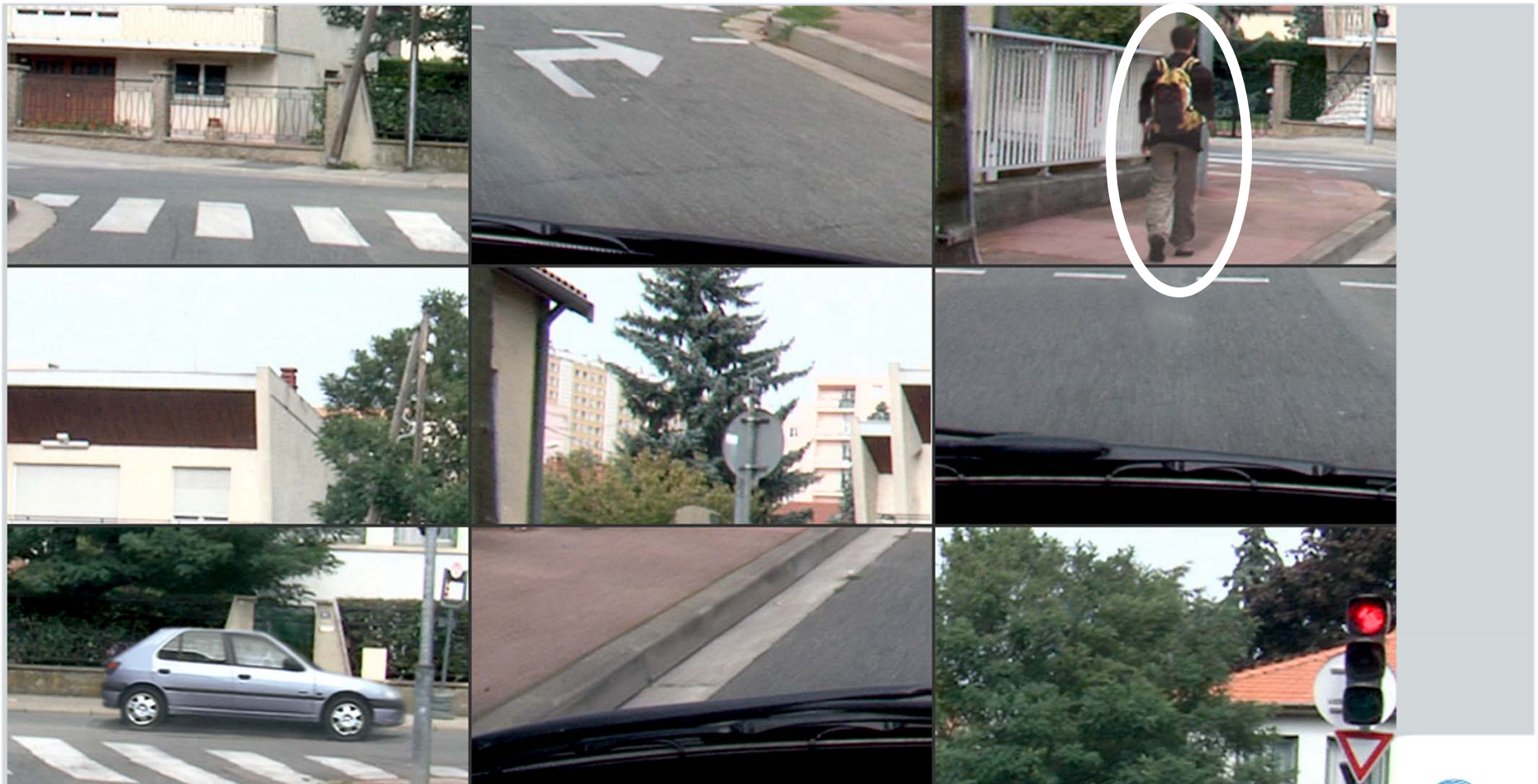
Procedure : Original condition



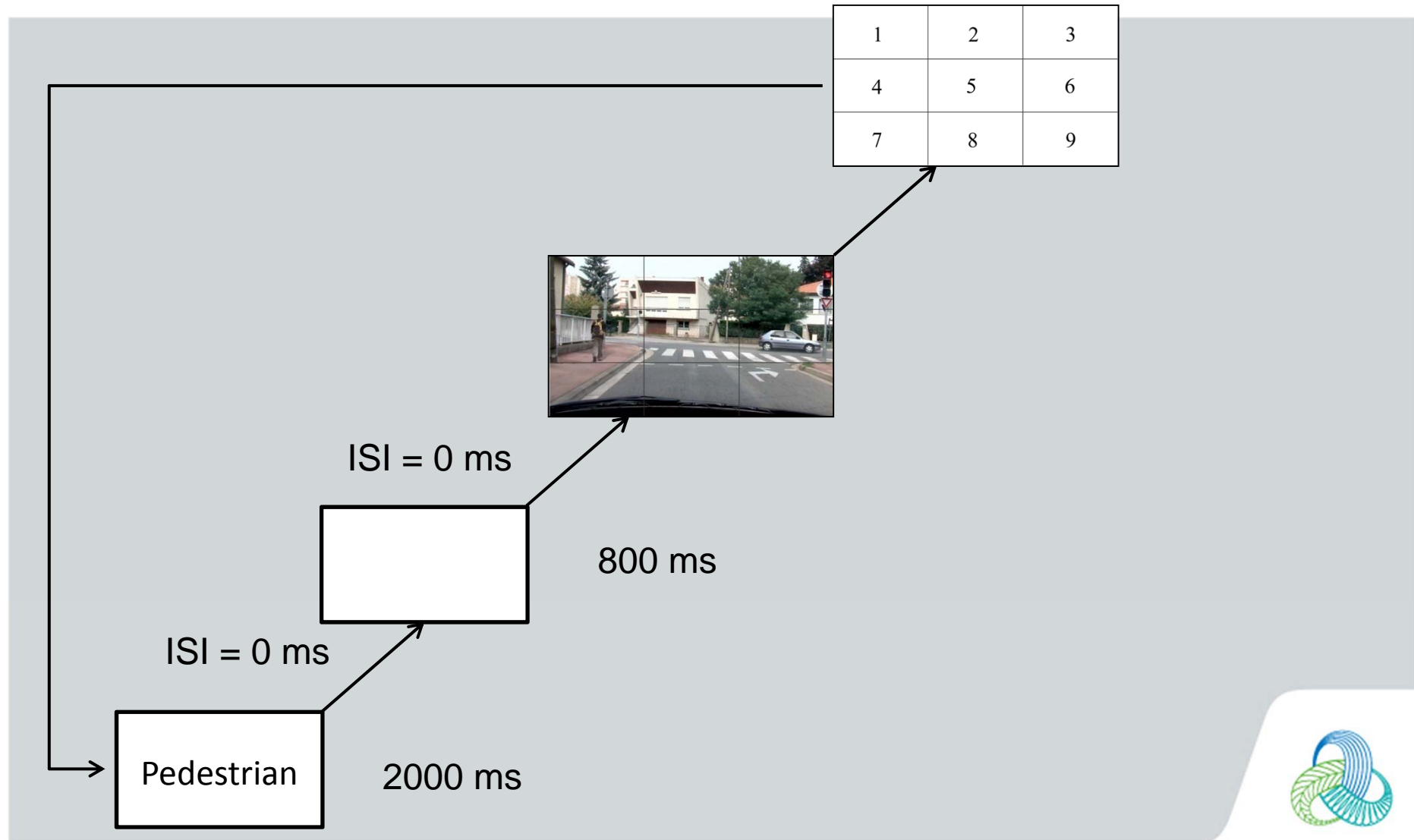
Procedure: Partly condition



Procedure: Fully condition



Procedure

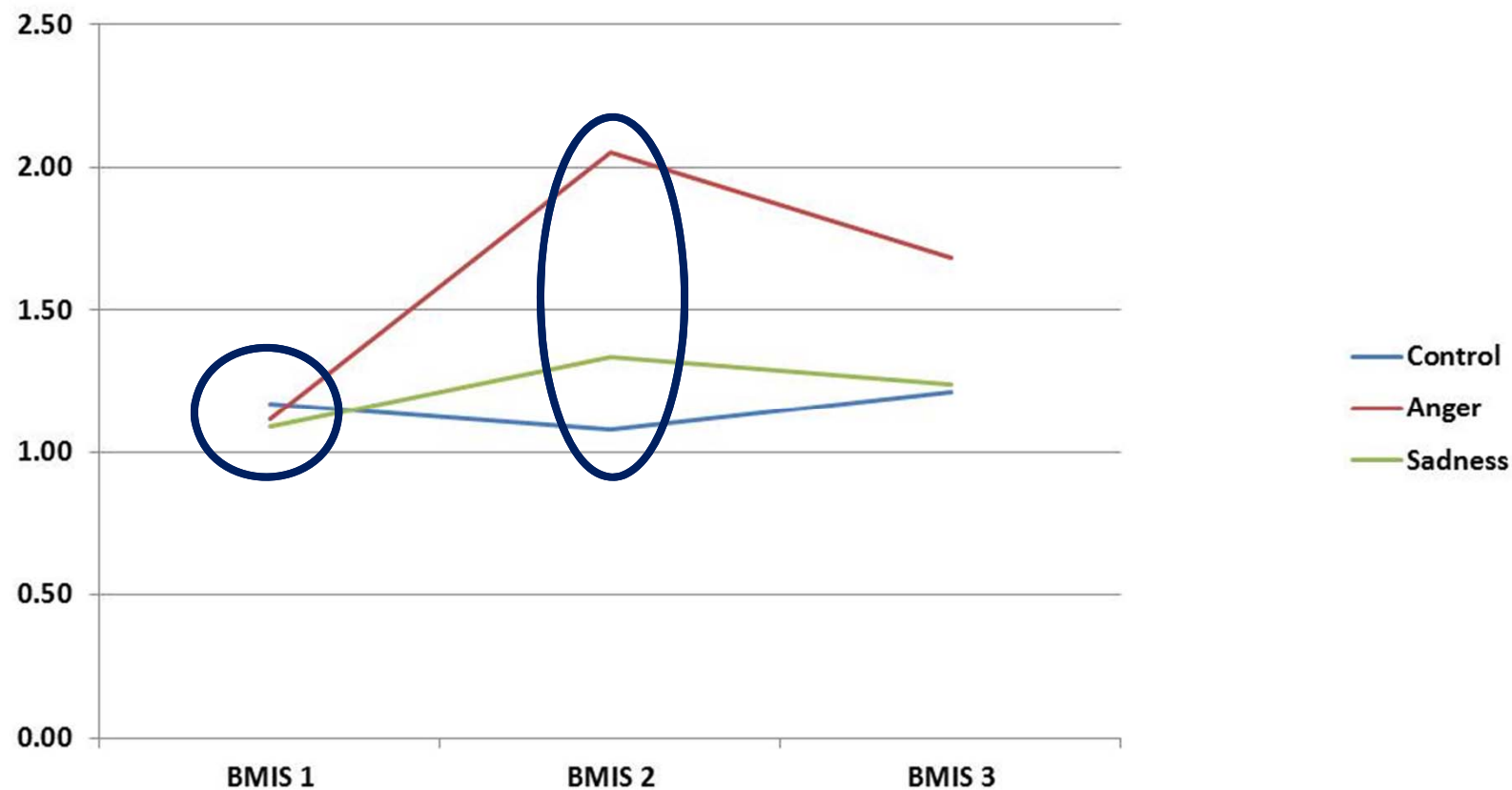


Hypotheses

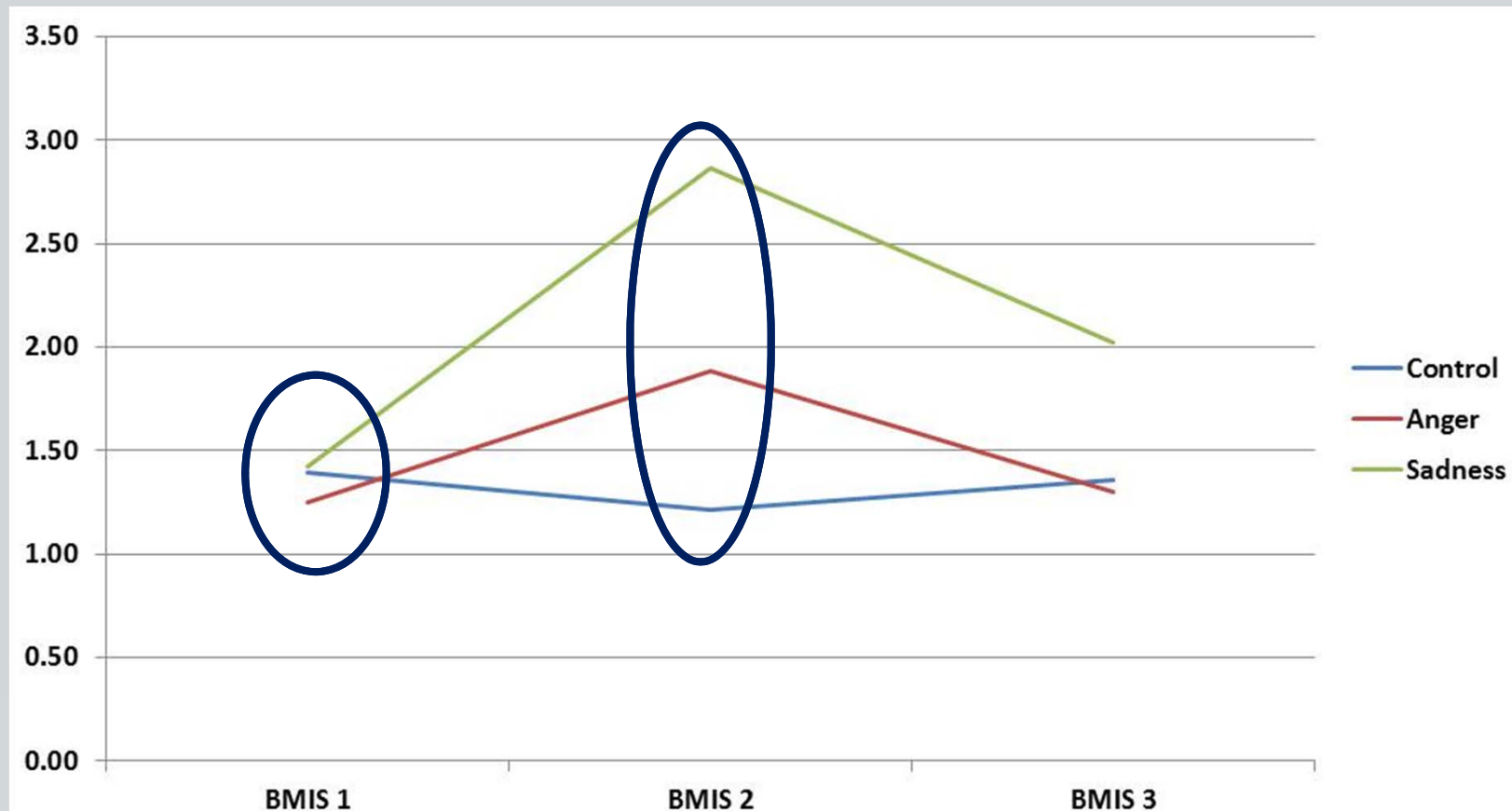
- ✓ Participants induced in Sadness will not rely on their driving schemata because of the irrelevant thoughts
→ original < partly = fully
- ✓ Participants of the Anger group will rely more on their schemata: they will expect the localization of the target
→ original < partly < fully
- ✓ Sadness group will make more errors than the other groups



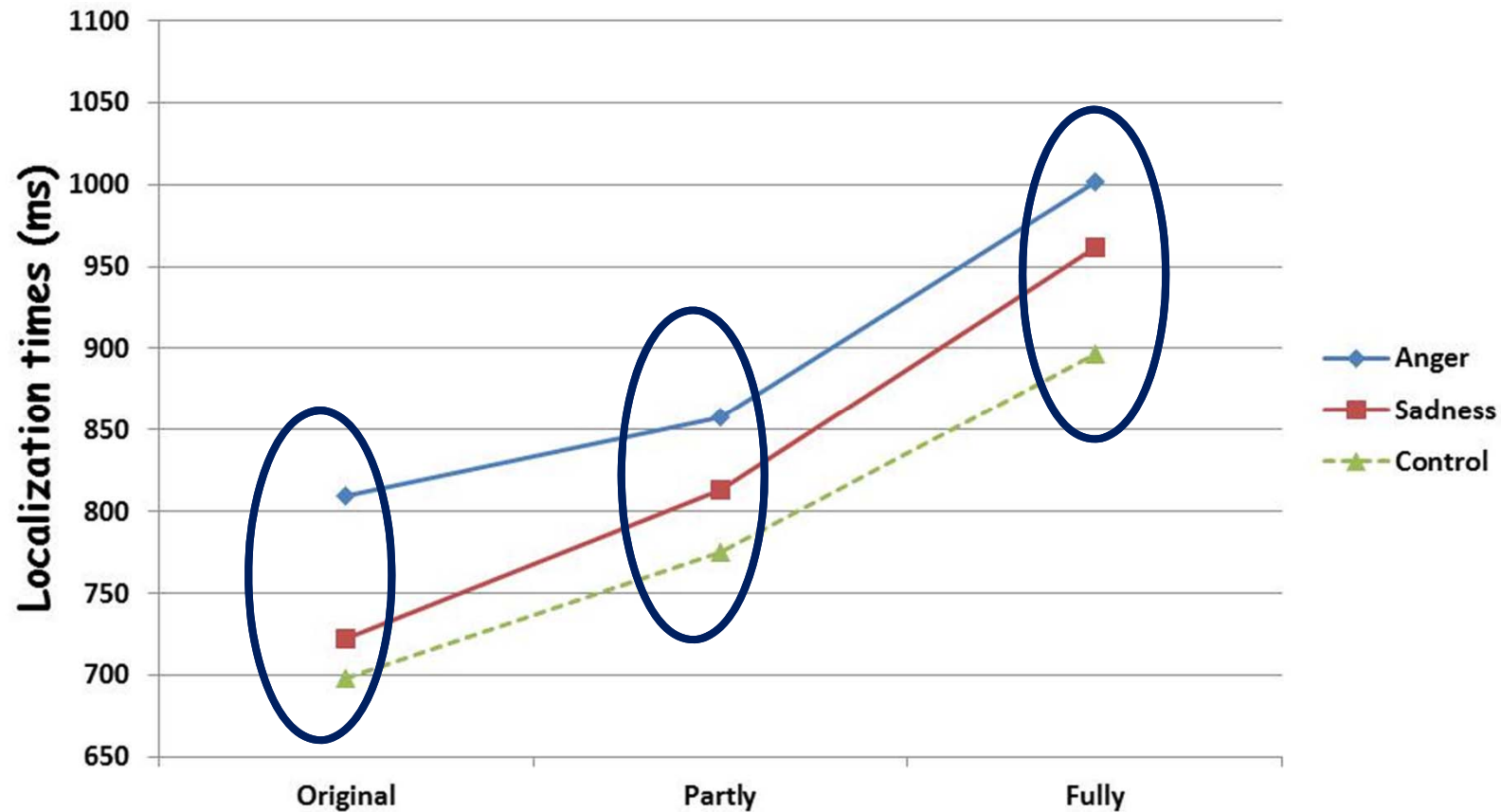
Results: BMIS Adjectives denoting « Anger »



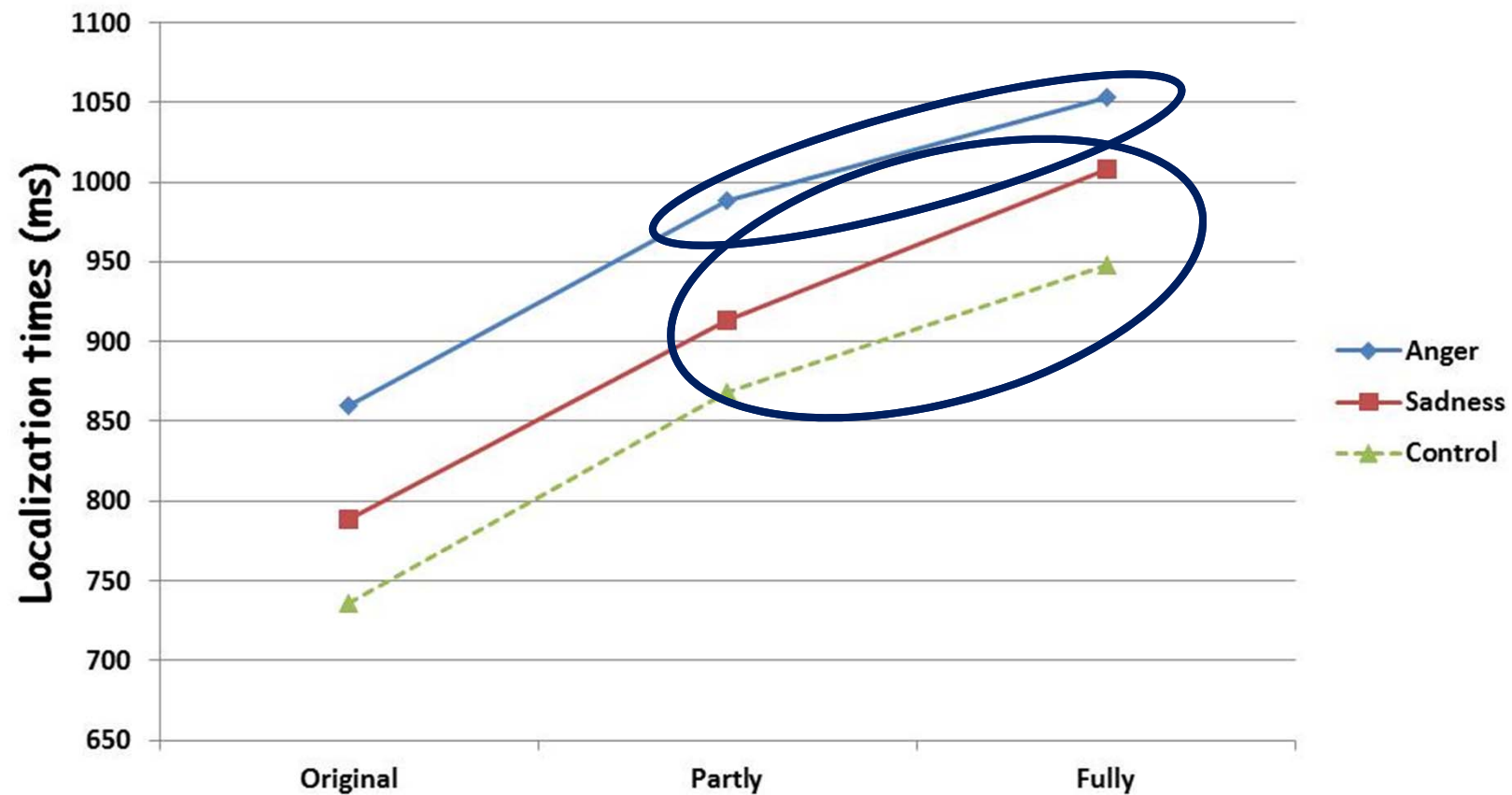
Results: BMIS Adjectives denoting « Sadness »



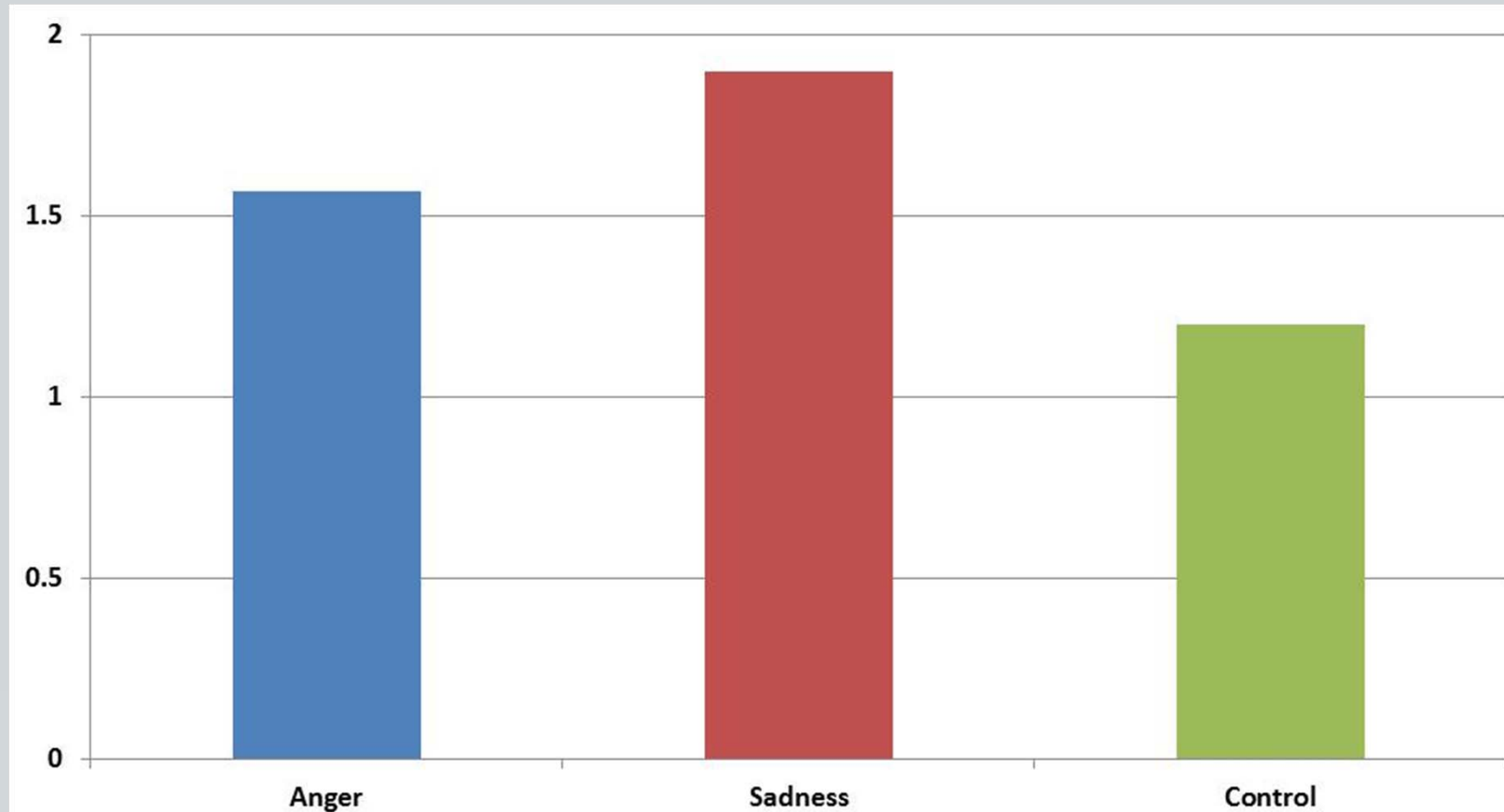
Results: Localization times for road users



Results: Localization times for road signs



Results: Errors in the localization



Discussion: top-down processing?

- ✓ Participants induced in **sadness** seemed to use their driving schemata to localize the targets.
- ✓ Was the task too easy ? → all participants were experienced drivers.
- ✓ The anger group did not expect the localization of the road sign targets. → RT : partly = fully conditions.



Discussion: inattention?

- ✓ Sadness group made more errors: due to Attentional self-focus and repetitive negative thoughts (Frijda, 1986; Lazarus, 1991) which interfere on information processing and on attentional processes (Huffziger & Kuehner, 2009).
- ✓ Participants induced in **anger** were slower to detect the targets even in the original condition → inattention ?
- ✓ Drivers exposed to anger could be slower to detect atypical hazards, i.e. hazards that are not congruent with their mood (Stephens & Groeger, in press).
- ✓ Sadness and Anger lead to inattention but may be in a different way?



Perspectives

- ✓ What is the cause of the slowness observed ?
 - ➔ Is it due to a poor visual search or to slowness in the information processing?
- ✓ Eye tracking data were collected during the experiment.
 - ➔ These data could measure the dynamic of the visual search observed in the anger condition.
 - ➔ These data reveal the number of saccades done during the visual search or the emergence of "looked-but-failed to see" phenomenon (Hills, 1980).
- ✓ A different way to study effects of emotions on driving
 - ➔ road rage = anger-provoking situations during driving



Thank you for your attention !

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