

Introduction

- Human spatial cognition tends to be egocentric.
- Perspective taking (PT) is the ability to imagine how a stimulus array will appear from another perspective (Kozhenikov & Hegarty, 2001).
- Moreover, taking other's perspective requires mental effort (Hart & Moore, 1973; Piaget & Inhelder, 1956; Shelton & McNamara, 1997).
- Most of the literature regards PT as a unitary process, and does not explore its components.
- Moreover, most of the researches used tests that measured PT in an un-pure manner. One example is the *Object Perspective Test*, for measuring individual ability of perspective taking (Hegarty & Waller, 2004; Kozhenikov & Hegarty, 2001).

The Current Study

- The purpose of this study is to deal with several limitations in Kozhenikov & Hegarty's (2001) *Object Perspective Test*:
 - 1) No baseline.
 - 2) The clock hands were always congruent with the observer's viewpoint.
 - 3) Ununified objects.
 - 4) Paper and pencil test.

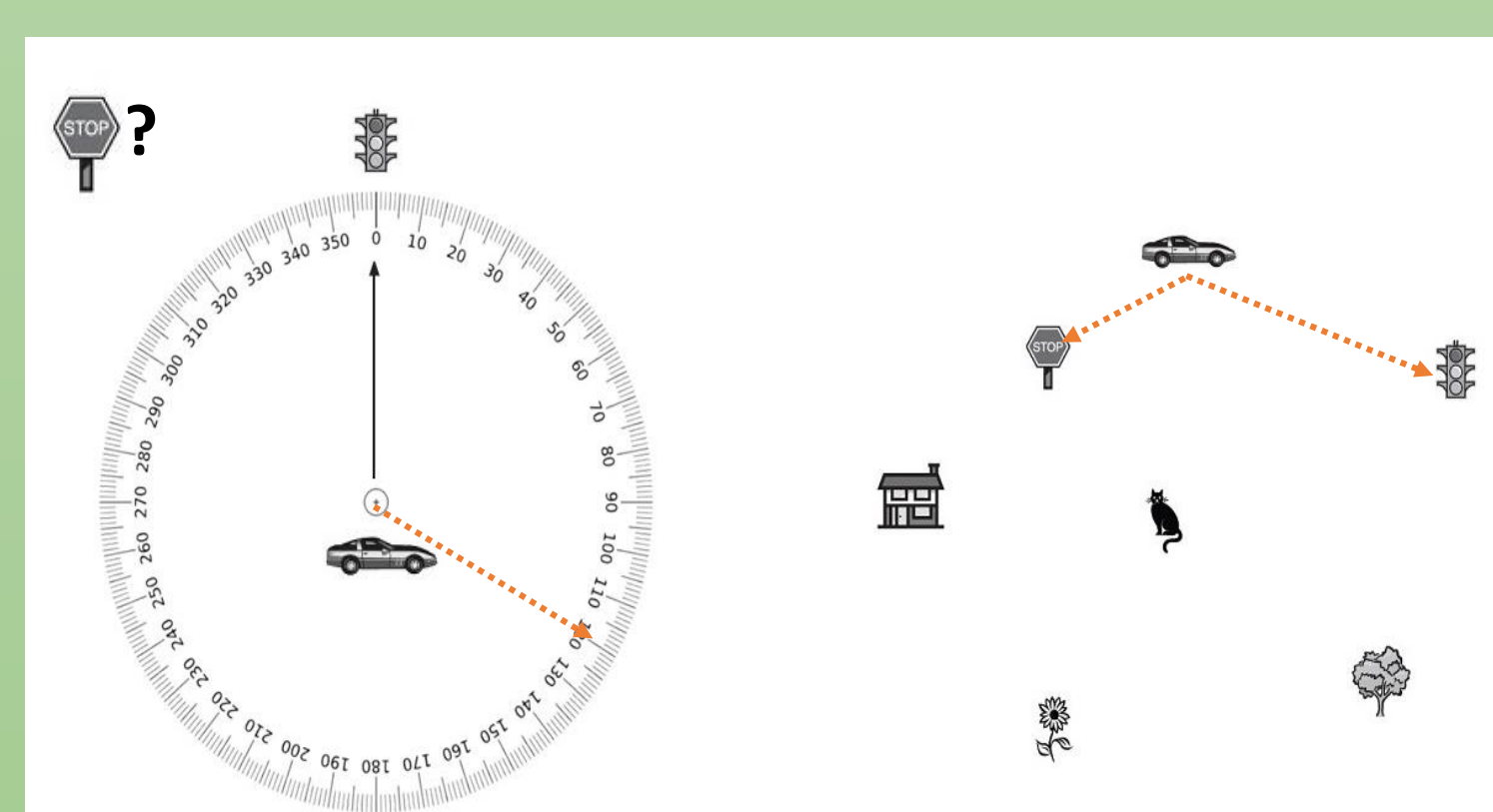


Figure 1. Illustration of a trial from the Object Perspective Test
On each item, participants were asked to imagine being at the position of one object in the display (the station point) facing another object (defining the imagined heading or perspective within the array) and was asked to indicate the direction to a third (target) object, by stretching a line on the circle.

We expected to find a congruency effect between the imagined headings of the array and the circle

Method

The Dots Task

- 2 Within subject variables (2X2): **Perspective** (0° = NO PT / 180° = PT), **Congruency** (smiley (mental location) and clock hands are congruent / incongruent).
- 1 Between variable: **Group** (group 1's angles for PT condition: 26°, 60°, 107°, 133°, 227°, 253°, 300°, 334°. group 2's angles for PT: 45°, 74°, 117°, 146°, 214°, 243°, 286°, 315°)
- 69 undergraduate students (Mean age= 23.66, SD= 1.99).
- Participants were allocated to 2 groups (N=39, 30) arbitrarily. Both groups completed the same task, but their dots configurations were a mirror view of each other (the config. was flipped on the X and the Y axes, for obtaining the same angles for both groups in both perspective conditions).

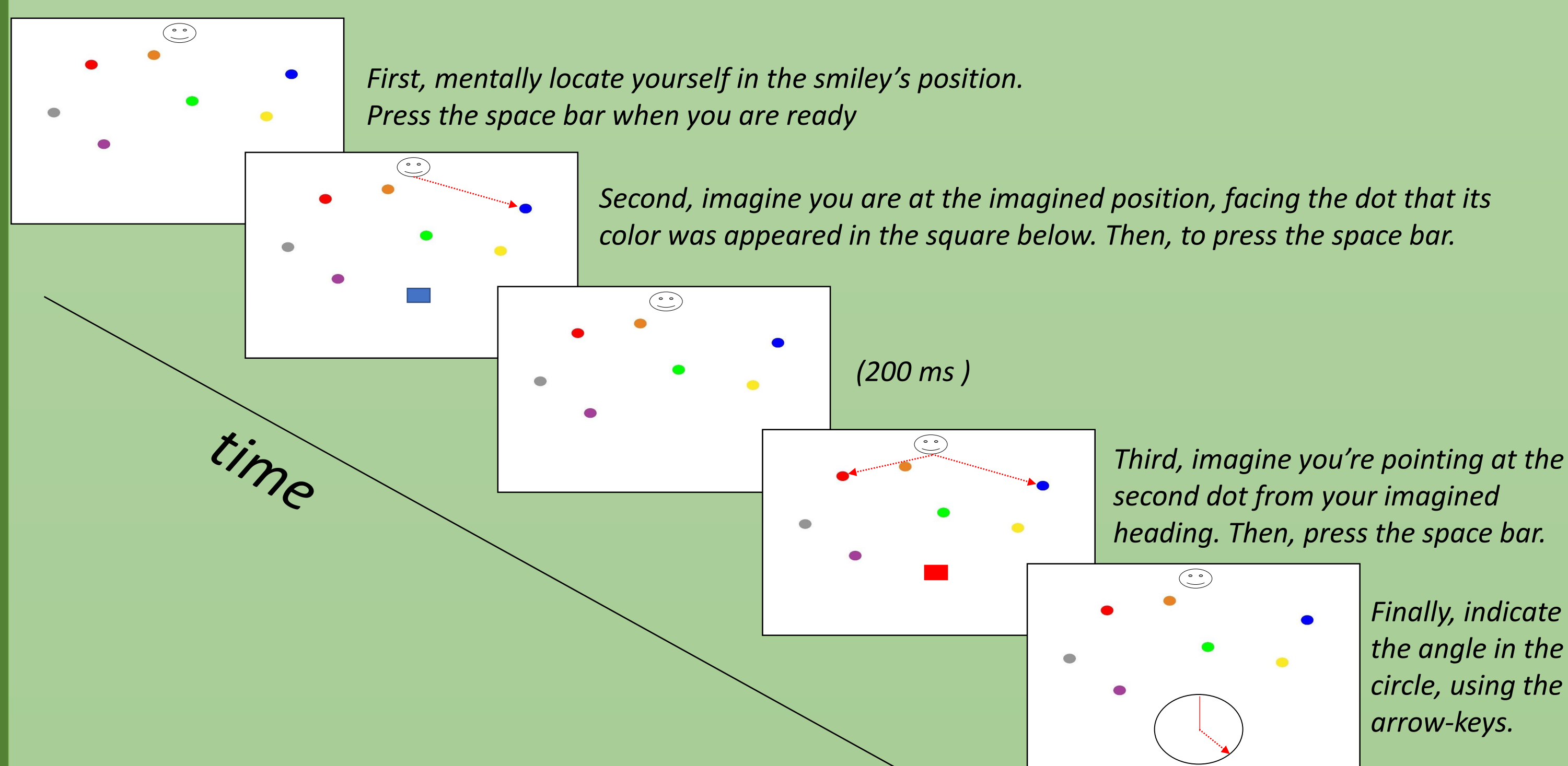


Figure 2. Schematic description of the task used in the experiment, with explanation given to participants on the practice trials. Both the smiley and the clock hands positions were manipulated in the experiment (see Figure 3.).

	Perspective 0	Perspective 180
Incongruent		
Congruent		

Figure 3. Schematic description of the 4 conditions included in the experiment.
The congruency relates to the smiley's position (mental position required from the participant) and the clock hands' position. Both positions appeared in a perspective that is aligned (0) or opposite (180) to the observer's view.

Results

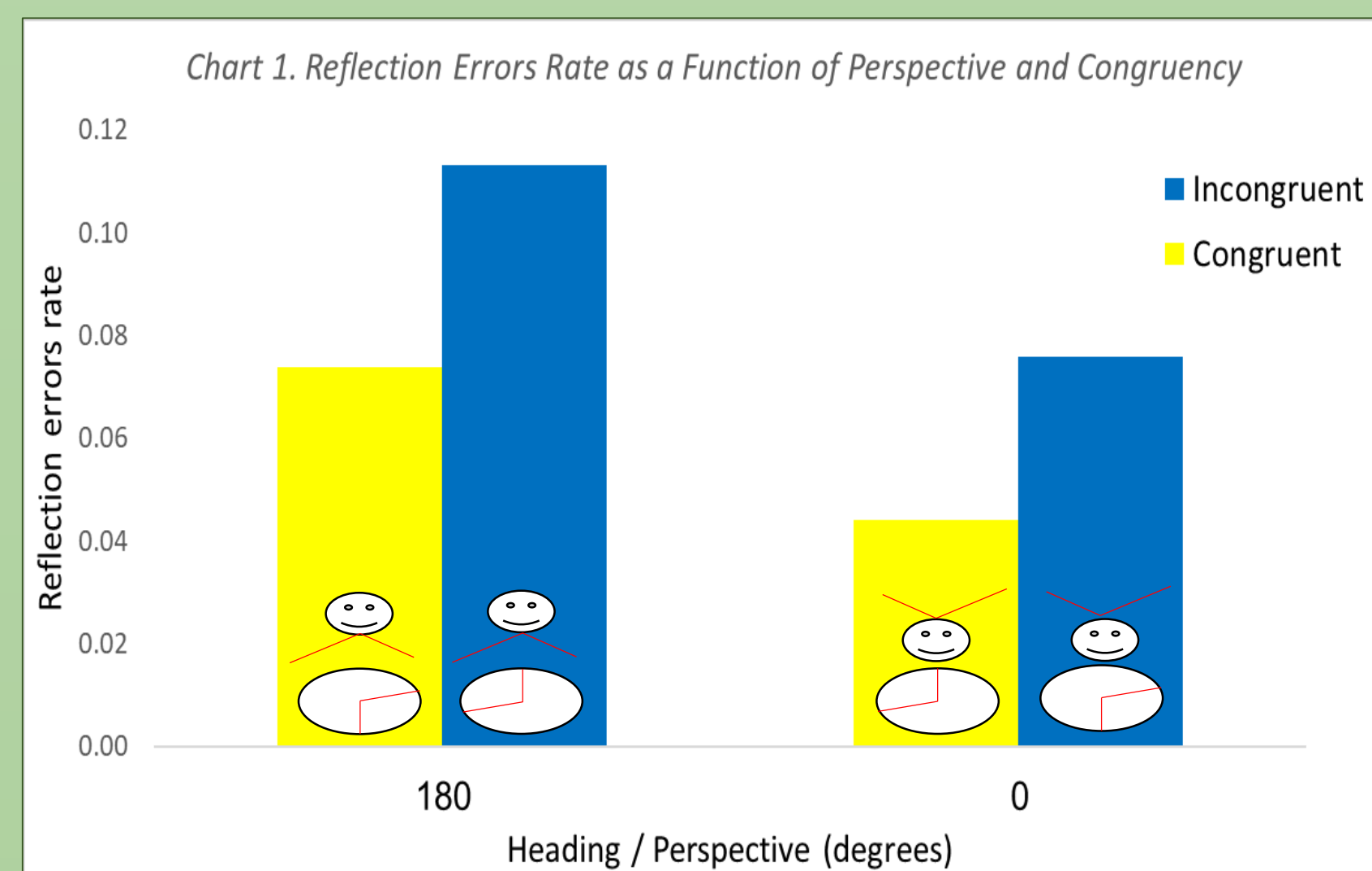


Chart 1. Errors in direction (right/left) as a function of the perspective (smiley's position: 0° / 180°) and smiley-clock congruency.

Perspective ($F(1, 67) = 4.56, p = .036$),
Congruency ($F(1, 67) = 4.12, p = .046$)

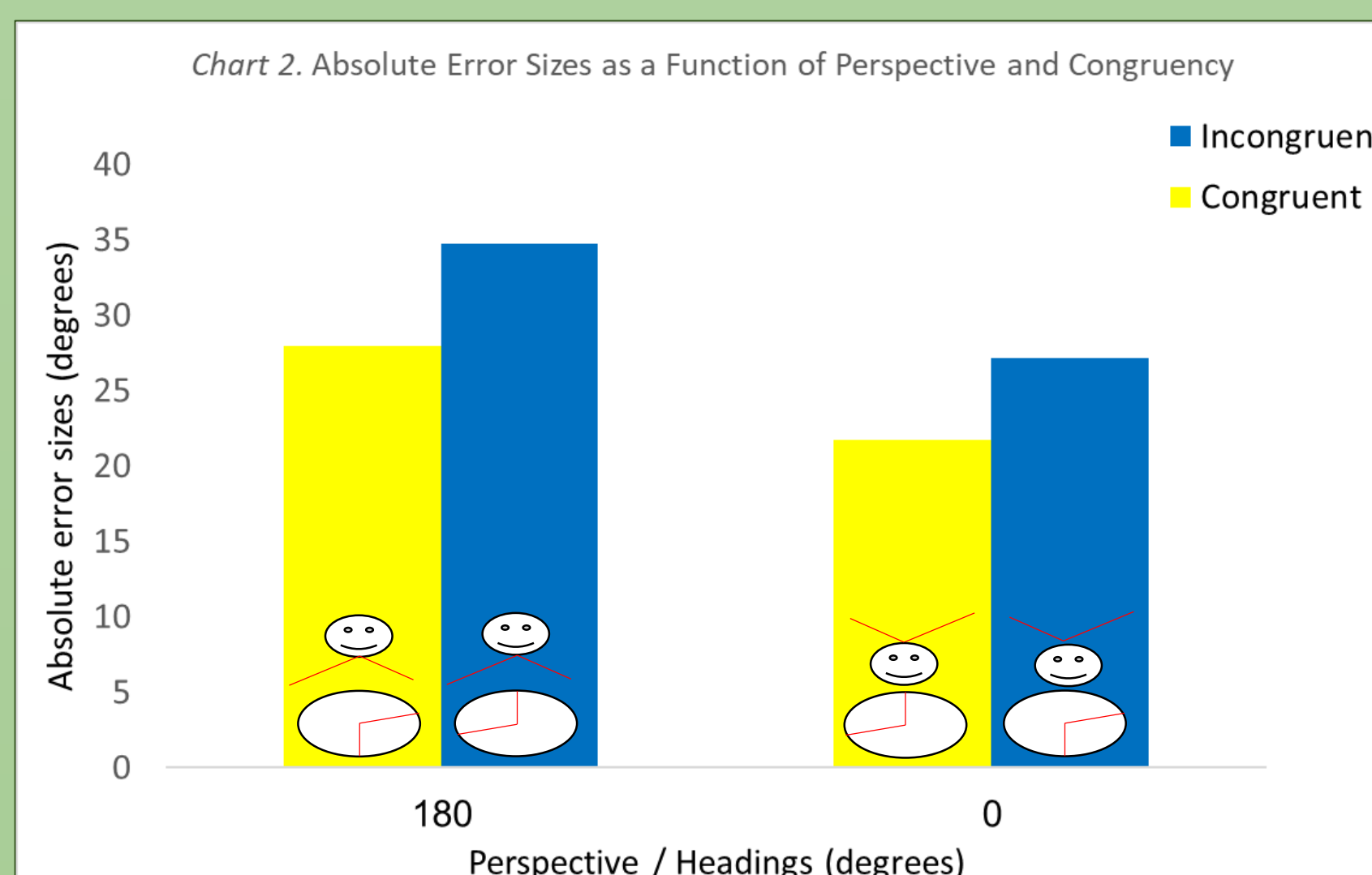


Chart 2. Absolute error sizes as a function of perspectives (smiley's position: 0° / 180°) and congruency (Incongruent / Congruent).

Perspective ($F(1, 67) = 4.89, p = .03$),
Congruency ($F(1, 67) = 4.38, p = .04$).

First response time measure (imagining the new perspective and pointing to the target) as a function of perspective (smiley's position: 0° / 180°). **Perspective** ($F(1, 67) = 33.083, p < .001$). 0° perspective - Mean = 5.86 seconds (SD = 3.11), 180° perspective - Mean = 7.12 seconds (SD = 4.12)

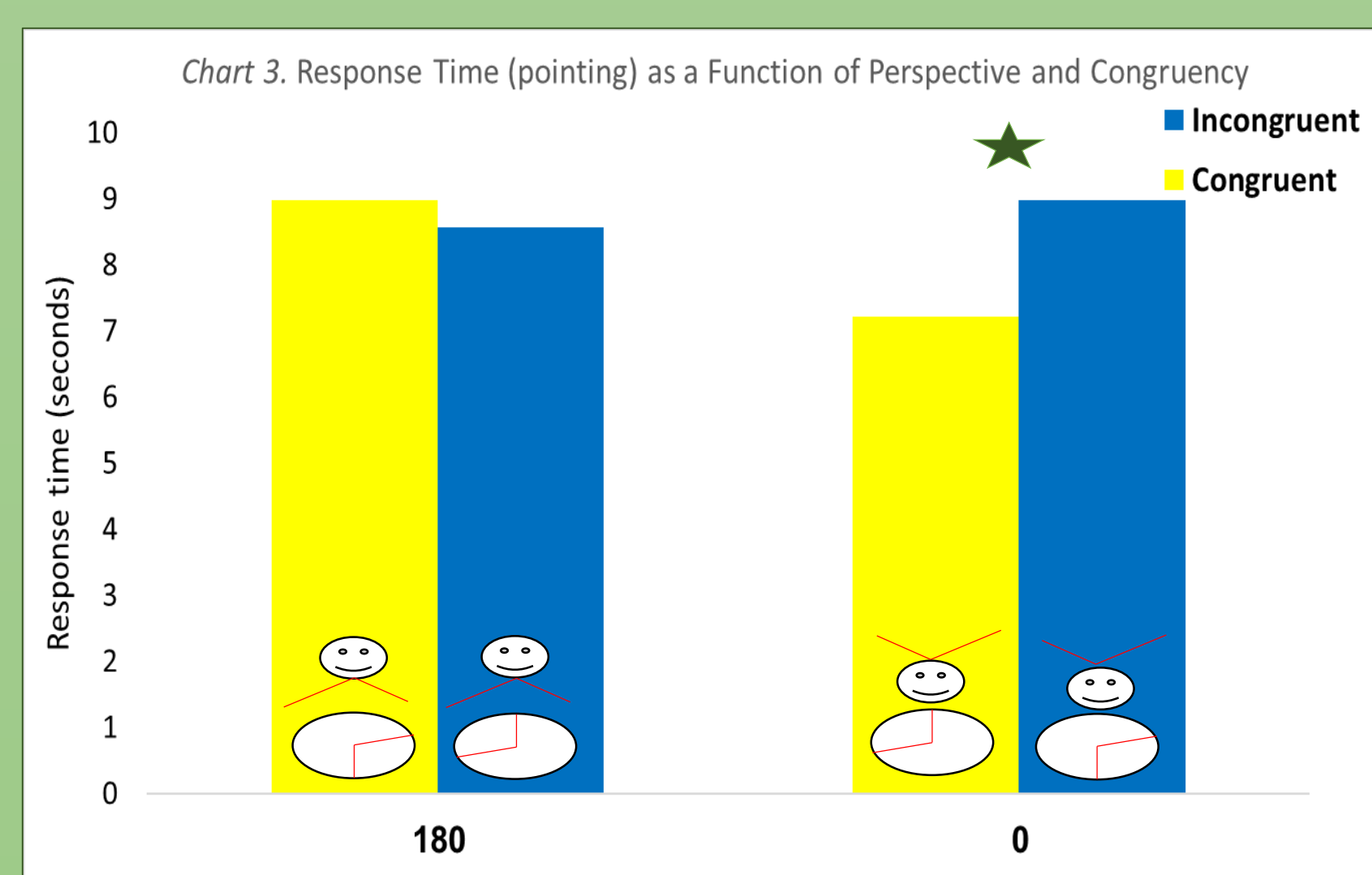


Chart 3. Second response time measure (imagining standing in the center of the circle and setting the angle) as a function of perspective and congruency.

Perspective ($F(1, 67) = 15.52, p < .001$), **congruency** ($F(1, 67) = 11.68, p = .001$),
Perspective X Congruency ($F(1, 67) = 44.22, p < .001$)

*The baseline (0°, Congruent) is significantly different from all other conditions

Discussion and Conclusions

- Taking mental perspective, which is different than our actual view, causes more egocentric mistakes and requires more mental effort in spatial process.**
- There is a congruency effect in the Dots Perspective Task:** When the smiley's position was incongruent to the clock hands' position – there were more egocentric errors and bigger absolute errors, in both perspectives as well.
- Shifts between perspectives cost bigger mistakes and more egocentric errors.**
First shift: the observer's perspective → the smiley's (imagined) perspective,
Second shift: the smiley's (imagined) perspective → the perspective created by the clock hands.
- Contrary to our expectations, in the second response time - there was no significant difference in the 180° perspective, between the congruent and incongruent trials.
- In other words, while indicating the angle in the circle, staying in the new perspective "charges" the same mental effort as does the shifting to a new position.
- It might be that activating a mental operation (shifting between my actual position to an opposite position), facilitates the second mental operation (shifting between the mental opposite position of the smiley, back to a position congruent to mine in the circle).**

References

- Hart, R. A., & Moore, G. T. (1973). *The development of spatial cognition: A review*. Aldine Transaction.
- Hegarty, M., & Waller, D. (2004). A dissociation between mental rotation and perspective-taking spatial abilities. *Intelligence*, 32 (2), 175-191.
- Kozhenikov, M., & Hegarty, M. (2001). A dissociation between object manipulation spatial ability and spatial orientation ability. *Memory & Cognition*, 29 (5), 745-756.
- Piaget, J., & Inhelder, B. (1956). *The child's concept of space*. Routledge & Paul.
- Shelton, A. L., & McNamara, T. P. (1997). Multiple views of spatial memory. *Psychonomic Bulletin and Review*, 4, 102-106.