DO MY HANDS PRIME YOUR HANDS?
EFFECTS OF (GRASPED) HANDLES ON KEYPRESS RESPONSES WITH TWO-HANDLED OBJECTS

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INTRODUCTION

- Research has shown that photos of graspable objects produce faster and more accurate responses when the position of the graspable part (i.e. the handle) and the actual responding hand of the participant are spatially aligned [1].
- Such correspondence or alignment effect has been interpreted as evidence in favour of automatic motor activation and has so far been studied with one-handled objects, that is, objects graspable on one side only [1-3].
- The aim of the present study is to explore whether a) graspable objects that are usually grasped by two hands (i.e. two-handled objects; e.g. shears) show similar effects when they are shown as grasped on one side; b) there is an effect of the viewpoint or perspective in which the grasping hands are shown (i.e. one's own vs. other people's viewpoint).

METHODS

Thirty-eight (Exp. 1), thirty-six (Exp. 2) and forty (Exp. 3) participants were asked to categorize 8 two-handled objects (Fig. 1) as being mainly used during spare time or while cooking. Each object could appear as not grasped, as grasped by the two hands, or as grasped by one hand only (i.e., left or right). When the object was grasped by one hand only, the grasping hand could be spatially compatible (on the same side) or incompatible (on the opposite side) with the response key. Across Experiments 1 and 2 we manipulated the perspective in which the grasping hands were shown (allocentric vs. egocentric), whereas in Experiment 3 we manipulated the response mode by replacing between-hands with within-hand responses (see Fig. 2 below for details).
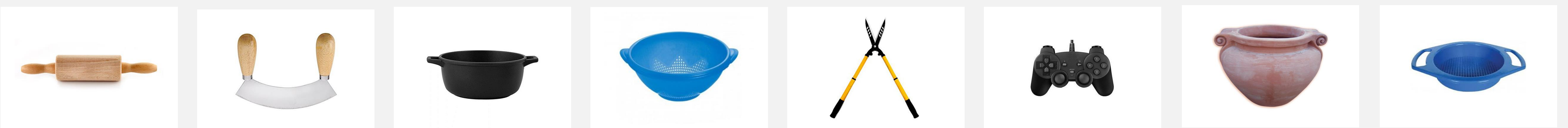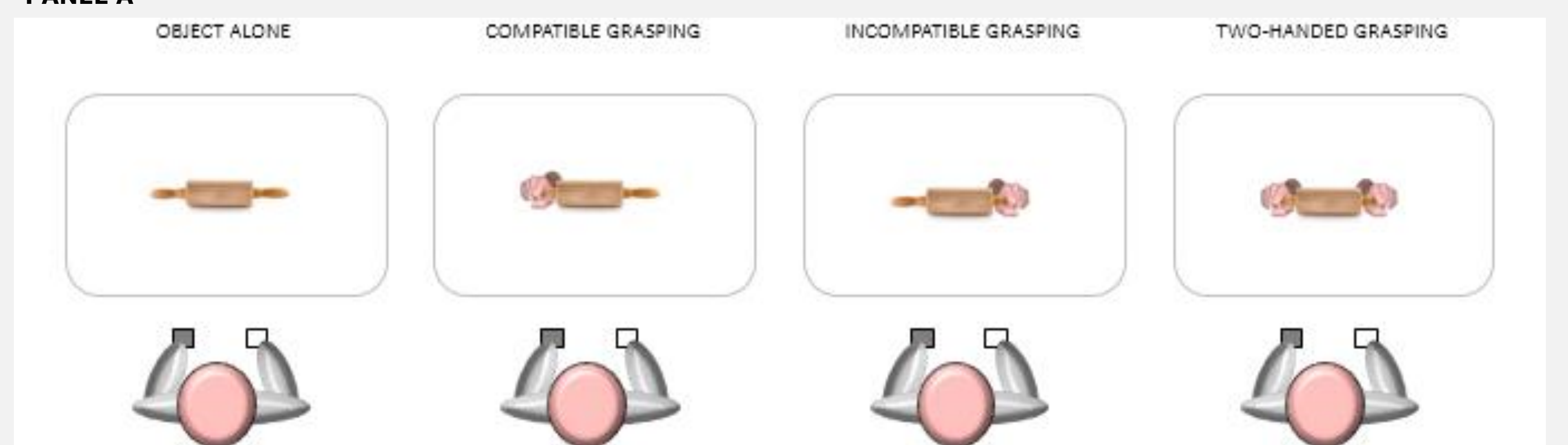

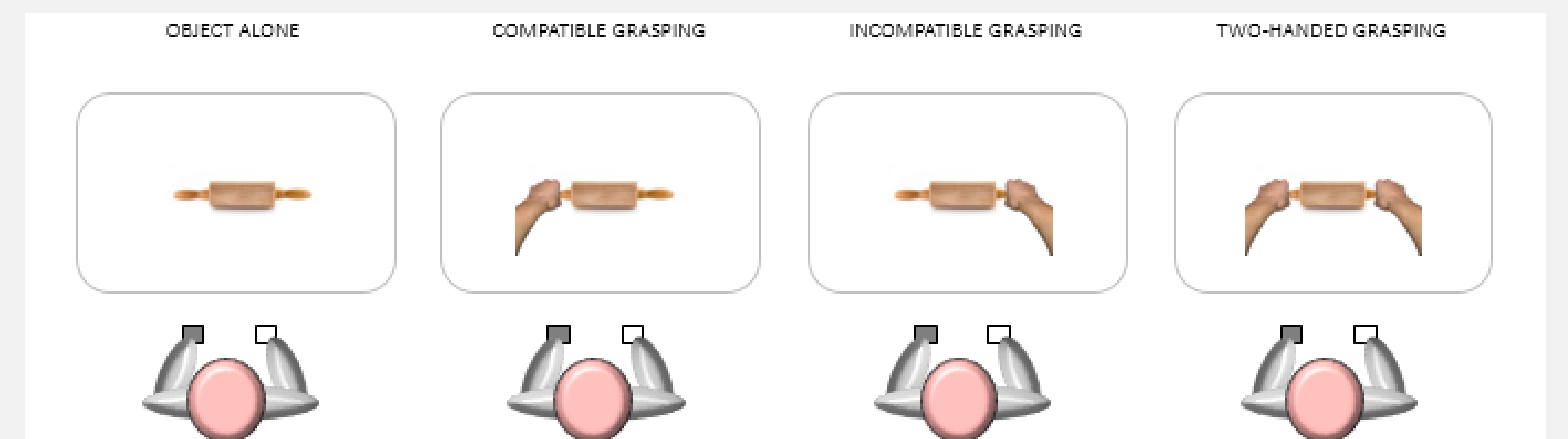**Fig. 1:** Two-handled objects used in experiments 1, 2 and 3.

Table 1: Mean RTs and percentages of error (with standard deviations in parentheses) as a function of *Condition* from all three Experiments.

Condition	Experiment 1		Experiment 2		Experiment 3	
	RTs (ms)	ERs (%)	RTs (ms)	ERs (%)	RTs (ms)	ERs (%)
Object Alone	**534** (50.2)	**3.1** (2.9)	**549** (63.0)	**4.2** (5.0)	**592** (74.0)	**4.3** (3.8)
Compatible Grasping	**531** (50.6)	**3.0** (2.2)	**543** (71.1)	**3.5** (5.5)	**593** (81.4)	**3.4** (4.0)
Incompatible Grasping	**546** (51.9)	**4.3** (3.7)	**571** (71.7)	**6.8** (6.7)	**612** (80.8)	**5.1** (5.1)
Two-Handed Grasping	**543** (52.5)	**3.2** (2.6)	**558** (70.9)	**3.9** (5.5)	**605** (77.1)	**3.7** (3.9)

Fig. 3: The correspondence effect in all three experiments.

COMPATIBLE GRASPING   INCOMPATIBLE GRASPING
— EXPERIMENT 1   — EXPERIMENT 2   EXPERIMENT 3

PANEL A
PANEL B
PANEL C
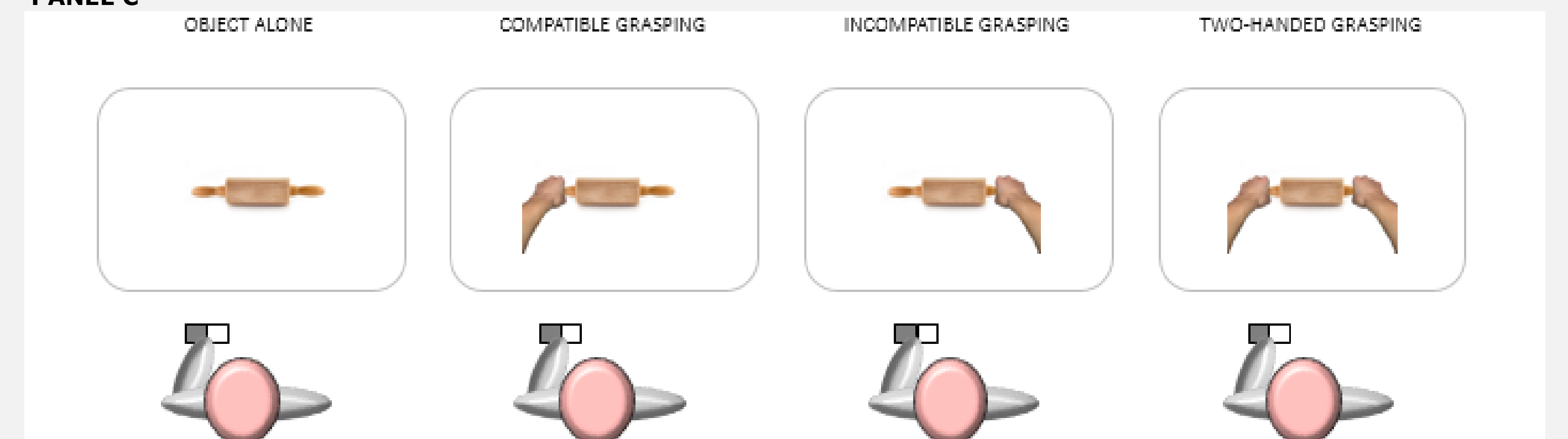OBJECT ALONE   COMPATIBLE GRASPING   INCOMPATIBLE GRASPING   TWO-HANDED GRASPING

Fig. 2: Illustration of the 4 experimental conditions in experiments 1 (panel A), 2 (panel B), and 3 (panel C).

RESULTS & DISCUSSION
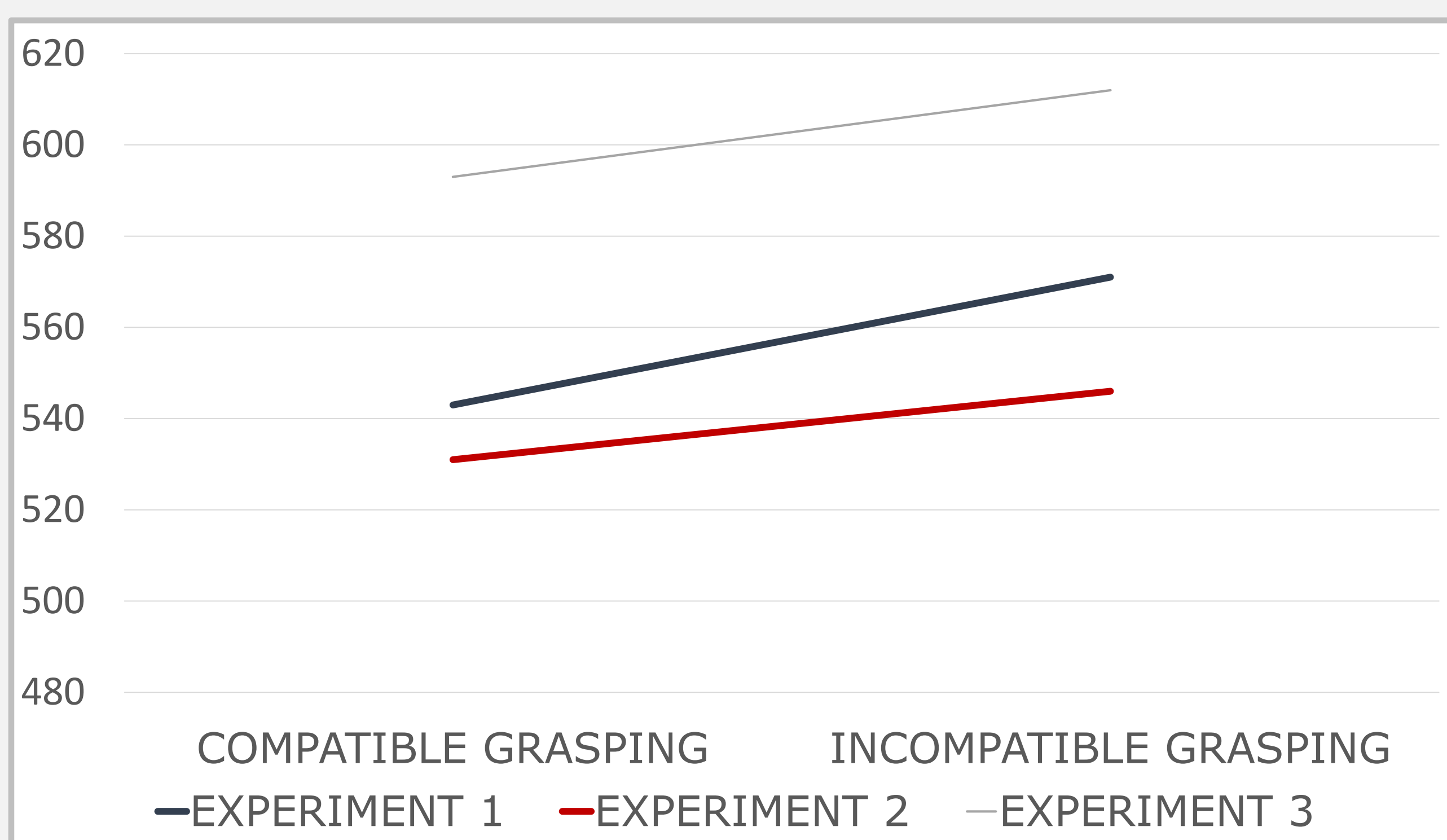
- For all three experiments a Repeated Analysis of Variance (ANOVA) with *Condition* as the within-subject factor was performed on RTs and ERs. The main effect of *Condition* was significant for RTs and ERs in Experiment 2 [$F(3,111) = 21.91$, $p < .001$, $\eta_p^2 = .372$ and $F(3,111) = 11.49$, $p < .001$, $\eta_p^2 = .237$, for RTs and ERs, respectively] and 3 [$F(3,117) = 23.95$, $p < .001$, $\eta_p^2 = .380$ and $F(3,117) = 6.56$, $p = .001$, $\eta_p^2 = .144$, for RTs and ERs, respectively], whereas it was significant for RTs only in Experiment 1 [$F(3,105) = 16.99$, $p < .001$, $\eta_p^2 = .327$]. Descriptive statistics shown in Table 1.
- For all three experiments Bonferroni-corrected planned comparisons revealed better performances in the Compatible Grasping compared to the Incompatible Grasping condition, indicating a facilitation for the processing of two-handled objects when they appeared as grasped on the same side as the response (i.e., correspondence or alignment effect).
- Further independent T-test aimed at comparing the magnitude of the correspondence effect revealed that the correspondence effect was smaller in Experiment 1 (15 ms) than in Experiment 2 (28 ms), $t(72) = 2.47$, $p = .016$, whereas it did not differ across experiments 2 and 3, $t(76) = 1.68$, $p = .097$. (see Fig. 3).
- Taken together, these results suggest that the activation of the motor system when viewing graspable objects may be moderated by the viewpoint in which the grasping hands are shown (our own vs. other people's). An object that is shown as already grasped by other people's hands might indeed be perceived as an object not available for one's own action. As such, it might induce activation in the motor system to a lesser extent [4, 5].

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