



# Effects of Angularity and Roundedness on Social Perception

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## INTRODUCTION

### Kinetic and structural invariants in embodied social perception

Cognitive approaches characterize human interaction as an extraordinarily complex and variable process that only offers vague cues to be deciphered by a cognizing agent. On the other hand, it is possible that there are a limited number of powerful, directly accessible embodied variables that define the basic nature of interactions. In the latter approach the basic question of social perception can be defined the following way: What are the structural and transformational invariants that, in the course of social interactions, specify what actions a given person "affords us"?

Affordances are defined as directly perceivable action possibilities offered by the environment for a given agent and specified by structural and transformational invariants (Gibson, 1979). In the social world one of the most basic affordance is whether another agent is approachable: whether s/he affords harmless (desirable) contact and cooperation.

Using an experimental technique that involved the systematic manipulation of two small rectangles moving horizontally in a narrow slot, A. Michotte (1946, 1991/1950) concluded that certain well-defined combinations of direction, velocity and distance elicited clear impressions of meaningful interactions, for example, chasing, going toward, pulling, fleeing. He also reported that these interactions appeared to have specific emotional significances for observers. The main dimension of these interactions was approach-avoidance. Michotte's results and interpretation supported the possibility that we can identify certain human actions not by inferential or memory processes but by detecting specific kinetic structures that actions display.

In his investigation Michotte focused on dynamic movement variables and did not pay attention to variables related to the agents as structural entities. It is likely, however, that structural invariants also play a role in the perception of approachability and in acts of approach, and, it seems, that one such structural variable can be angularity of shape (Aronoff and Woike, 1992; Aronoff, Woike, and Hyman, 1992).

Angularity as an invariant of visual information also can be detected across the auditory domain as well. Kohler (1947) suggested that presenting the drawings of an irregular roundish form and an irregular jagged form, and given the forced choice of two names for the two forms people would uniformly choose the nonsense word "takete" for the jagged form and the nonsense word "maluma" for the roundish form. This expectation has gained support under experimental conditions (Lindauer, 1990a, 1990b).

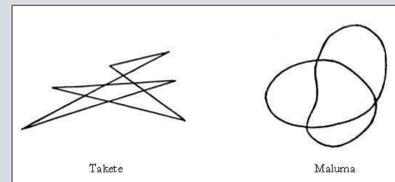
## THE AIM OF THE STUDY

The purpose of the present study is to explore structural and kinetic informational invariants underlying the perception of hostility and friendliness in social encounters. We propose that the embodied experience of angularity and roundedness in form and movement is reacted in the social perception of friendliness and hostility, which is, furthermore, related to the affordance of approachability.

## METHOD

Fourteen University of Szeged undergraduates participated in the experiment. Using a modified version of Michotte's experimental technique, subjects were shown a simple computer display involving various types of encounters between two agents depicted as geometric "takete" and "maluma" figures (Figure 1), moving along a linear path. After every encounter, participants were asked to find a comfortable distance between the two agents (positioning) and to judge the encounter using a "hostility-friendliness scale" and also to answer questions about the nature of the encounters. After this session participants were asked to decide which figure was more dominant, aggressive, which figure they sympathize with more and to choose the "maluma" or "takete" words for the figures.

**Figure 1.** "Takete" and "Maluma" from W. Kohler, 1947/38, p.243.



Experiment design involves the manipulation of two variables, both related dominantly to the active agent (A). Kinetic variables include A's direction and velocity, structural variables involve the shape of the figures. Events are designed so that structural and transformational invariants are either congruent or incongruent (see Table 1).

Incongruent Condition	A's Shape (active agent)	A's Movement	B's Shape (passive agent)	B's Movement
Hostile encounter 1.	Roundish form: "Maluma."	High velocity approach, violent contact, stops.	Angular form: "Takete."	Harsh contact sends it off, disappears on the right.
Friendly encounter 1.	Angular form: "Takete."	Low velocity approach, soft contact, stay together.	Roundish form: "Maluma."	A and B move on together, disappearing on the right.
Congruent Condition	A's Shape	A's Movement	A's Shape	B's Movement
Hostile encounter 2.	Angular form: "Takete"	High velocity approach, violent contact, stops.	Roundish form: "Maluma."	Violent contact sends it off, disappears.
Friendly encounter 2.	Roundish form: "Maluma."	Low velocity approach, soft contact, stay together.	Angular form: "Takete"	A and B move on together, disappearing on the right.

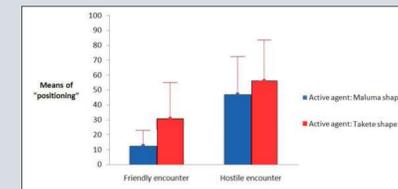
**Table 1.** Summary of events. Incongruent events will display conflicting information (e.g. an angular figure moving in "friendly" manner). Incongruent events do not provide clear information about A's hostility or friendliness because structural characteristics (e.g. roundedness) do not fully support dynamic invariants (e.g. hostile approach and contact).

## RESULTS

In order to see the differences in participants' judgments the average values of positioning and "hostility - friendliness" scale were tested with paired sample t-test, and the distribution of the answers were also calculated.

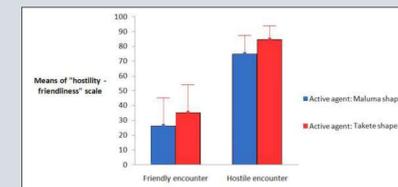
Figure 2 shows that participants positioned farther the passive agent from the active agent in the hostile encounters [ $t(13)=2.344, p = .036$ ;  $t(13)=3.044, p = .006$ ] and set smaller distance if the active agent had maluma shape, however the differences are not significant [ $t(13)=1.756, p = .103$ ;  $t(13)=1.158, p = .268$ ].

**Figure 2.** Average values of the comfortable distance set by the participants in different encounters.



The average values of the "hostility - friendliness" scale indicate that participants found the encounters more hostile when the active agent approached the passive agent with high velocity and violent contact:  $t(13)=4.968, p < .01$ ;  $t(13)=5.540, p < .01$  (Figure 3). Figure 3 also shows that participants judged the encounters more hostile when the active agent had "takete" shape, however the differences are not significant [ $t(13)=1.242, p = .236$ ;  $t(13)=1.378, p = .192$ ].

**Figure 3.** Average values of "hostility - friendliness" scale in different encounters.



In spite of the participants having seen both figures in all congruent and incongruent conditions they found "takete" more aggressive than "maluma". However 50 % of the participants felt no difference (Figure 4).

**Figure 4.** Participants' judgments about the aggressiveness of "maluma" and "takete" figures.

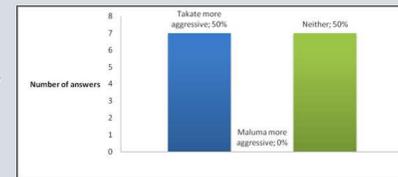
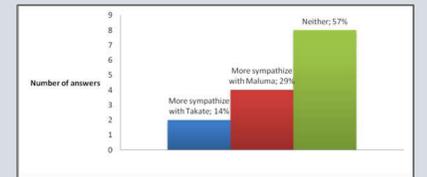


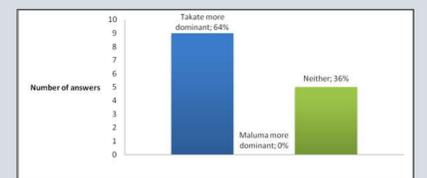
Figure 5 shows that 57 % of the participants felt no difference in sympathizing with the figures, but those who did, preferred "maluma" (29%) over "takete" (14%).

**Figure 5.** The proportion of participants in sympathizing with "maluma" and "takete" figures.



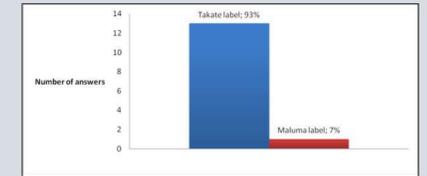
After having seen all encounters, 64 % of the participants judged that "takete" is more dominant. There was no participant who felt that "maluma" is more dominant than "takete".

**Figure 6.** Participants' judgments about the dominance of "maluma" and "takete" figures.



In choosing the name for both agents from a pool of nonsense words containing ones with "angular" characteristics and "rounded" characteristics, 93% of the participants matched the takete word for the "takete" shape (Figure 7).

**Figure 7.** The proportion of participants choosing the label for "takete" figure.



## CONCLUSIONS

Our results showed that structural and kinetic variables tend to support each other, however kinetic information is dominating. The distributions of answers suggest that structural information plays a relevant role in the perception of friendliness and hostility. These findings confirm the robustness of previous findings (A. Michotte, 1946, 1991/1950; Aronoff, Woike, and Hyman, 1992; Lindauer, 1990a, 1990b). Further studies are needed to clarify the exact role of angularity and roundedness in the perception of affordance of approachability and in the embodied perception of friendliness and hostility.

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