

Dogs outperform cats both in their testability and relying on human pointing gestures:  
a comparative study

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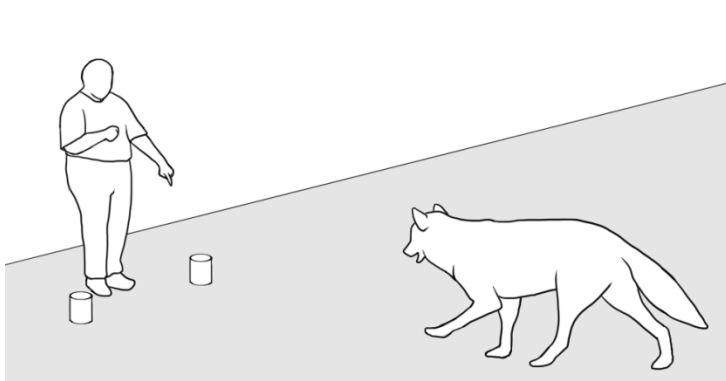
### Supplementary Information

In the Miklósi et al. (2005) study, the experimenter was kneeling to be low enough to be properly visible for the cats, and she displayed the pointing from farther back behind the line of the two bowls in order to keep the 80 cm pointing distance. Also, she was able to place the two bowls simultaneously, as the distance between the two bowls was 1.3-1.6 m. However, this way, from the subject's point of view, the tip of the pointing finger and the bowl do not look 80 cm apart (see Supplementary Fig. S1), and the task resembles a proximal pointing (<40 cm; see Miklósi and Soproni, 2006).



**Supplementary Figure S1.** ‘Distal’ pointing from the subject’s point of view with an embedded picture showing the experimenter’s point of view (Miklósi et al., 2005). Even though the kneeling experimenter points at the target object from a distance of 70-80 cm, it resembles proximal pointing (<40 cm) from the subject’s point of view. Presented with courtesy of the authors.

One way to keep the 80 cm distance would be to make the E stand up and keep the bowls in the same place, hence have the 80 cm distance almost vertically. In this way the pointing finger may be almost above the pointed bowl (Supplementary Fig. S2), which does not require the extrapolation of the vector of the pointing finger.



**Supplementary Figure S2.** Pointing gesture reproduced based on Udell et al. (2008). The pointing finger is almost above the pointed object. This type of pointing does not require much extrapolation of the vector of the pointing finger and therefore the subject may use a simpler strategy to solve the two-way object choice task.

## References:

- Miklósi, Á., Pongrácz, P., Lakatos, G., Topál, J. & Csányi, V. A comparative study of the use of visual communicative signals in interactions between dogs (*Canis familiaris*) and humans and cats (*Felis catus*) and humans. *J. Comp. Psychol.* **119**, 179-186 (2005).
- Miklósi, Á. & Soproni, K. A comparative analysis of animals' understanding of the human pointing gesture. *Anim. Cogn.* **9**, 81-93 (2006).
- Udell, M. A., Dorey, N. R. & Wynne, C. D. Wolves outperform dogs in following human social cues. *Anim. Behav.* **76**, 1767-1773 (2008).

**Supplementary Table S1.** The test location and results of the enrolled 43 cats. In the laboratory, 10 cats were excluded (7 before the test - failed motivation test or did not come out of the box, 2 during the test - health problem or bit the owner, 1 excluded after the test due to technical problems with the video recording), while 4 cats were excluded at home (2 before the test - failed motivation test, 2 during the test - hid behind the bed). Cats that chose less than 14 times (from the two conditions combined) were not included in the success analyses (laboratory: N=18, at home: N=5). Cats were considered testable when they made a choice at least 14 times out of 28 (laboratory: N=15, at home: N=14) and for these cats the number of correct choices and all choices are shown. Dashes indicate cats that were not tested at home due to COVID-19 outbreak (N=21).

| Cat ID | Laboratory                  |                            | Home                        |                            |
|--------|-----------------------------|----------------------------|-----------------------------|----------------------------|
|        | DDS (correct / all choices) | DM (correct / all choices) | DDS (correct / all choices) | DM (correct / all choices) |
| C1     | 6 / 12                      | 4 / 7                      | -                           | -                          |
| C2     | 8 / 10                      | 7 / 9                      | -                           | -                          |
| C3     | 7 / 11                      | 8 / 14                     | -                           | -                          |
| C4     | 10 / 13                     | 9 / 12                     | -                           | -                          |
| C5     | 8 / 14                      | 10 / 14                    | -                           | -                          |
| C6     | 4 / 8                       | 5 / 8                      | -                           | -                          |
| C7     | 5 / 9                       | 4 / 6                      | -                           | -                          |
| C8     | 9 / 12                      | 6 / 12                     | -                           | -                          |
| C9     | 6 / 8                       | 4 / 8                      | -                           | -                          |
| C10    | 9 / 14                      | 5 / 11                     | -                           | -                          |
| C11    | 9 / 13                      | 7 / 12                     | -                           | -                          |
| C12    | 8 / 11                      | 6 / 11                     | -                           | -                          |
| C13    | <14 choices combined        |                            | failed motivation test      |                            |
| C14    | <14 choices combined        |                            | failed motivation test      |                            |
| C15    | <14 choices combined        |                            | hid behind the bed          |                            |
| C16    | <14 choices combined        |                            | -                           | -                          |
| C17    | <14 choices combined        |                            | -                           | -                          |

|     |                        |        |                      |         |
|-----|------------------------|--------|----------------------|---------|
| C18 | <14 choices combined   |        | -                    | -       |
| C19 | <14 choices combined   |        | -                    | -       |
| C20 | 7 / 11                 | 7 / 9  | 11 / 14              | 9 / 13  |
| C21 | 4 / 7                  | 3 / 9  | 9 / 13               | 4 / 13  |
| C22 | 10 / 12                | 8 / 11 | 7 / 7                | 9 / 9   |
| C23 | <14 choices combined   |        | 9 / 14               | 8 / 14  |
| C24 | <14 choices combined   |        | 8 / 12               | 8 / 11  |
| C25 | <14 choices combined   |        | 4 / 9                | 7 / 10  |
| C26 | <14 choices combined   |        | 8 / 11               | 10 / 13 |
| C27 | <14 choices combined   |        | 10 / 14              | 11 / 14 |
| C28 | <14 choices combined   |        | 7 / 9                | 2 / 6   |
| C29 | <14 choices combined   |        | <14 choices combined |         |
| C30 | <14 choices combined   |        | <14 choices combined |         |
| C31 | <14 choices combined   |        | <14 choices combined |         |
| C32 | <14 choices combined   |        | <14 choices combined |         |
| C33 | <14 choices combined   |        | <14 choices combined |         |
| C34 | failed motivation test |        | 1 / 9                | 6 / 11  |
| C35 | failed motivation test |        | 8 / 11               | 7 / 8   |
| C36 | did not leave the box  |        | 11 / 13              | 12 / 13 |
| C37 | failed motivation test |        | 5 / 9                | 5 / 7   |

|     |                         |                    |       |
|-----|-------------------------|--------------------|-------|
| C38 | test video not recorded | 8 / 8              | 6 / 8 |
| C39 | failed motivation test  | hid behind the bed |       |
| C40 | health problem          | -                  | -     |
| C41 | failed motivation test  | -                  | -     |
| C42 | cat bit the owner       | -                  | -     |
| C43 | failed motivation test  | -                  | -     |

**Supplementary Table S2.** The laboratory test results of the enrolled 21 dogs.

| Dog ID | Laboratory                  |                            |
|--------|-----------------------------|----------------------------|
|        | DDS (correct / all choices) | DM (correct / all choices) |
| D1     | 11 / 15                     | 8 / 13                     |
| D2     | 8 / 11                      | 8 / 13                     |
| D3     | 9 / 14                      | 9 / 14                     |
| D4     | 8 / 13                      | 10 / 15                    |
| D5     | 7 / 14                      | 7 / 14                     |
| D6     | 11 / 14                     | 11 / 14                    |
| D7     | 12 / 14                     | 9 / 14                     |
| D8     | 14 / 14                     | 14 / 14                    |
| D9     | 7 / 14                      | 11 / 14                    |
| D10    | 14 / 14                     | 14 / 14                    |

|     |         |         |
|-----|---------|---------|
| D11 | 11 / 15 | 9 / 13  |
| D12 | 9 / 14  | 8 / 14  |
| D13 | 12 / 14 | 13 / 14 |
| D14 | 8 / 13  | 9 / 13  |
| D15 | 7 / 14  | 9 / 14  |
| D16 | 9 / 14  | 9 / 14  |
| D17 | 12 / 14 | 13 / 14 |
| D18 | 14 / 15 | 13 / 13 |
| D19 | 10 / 14 | 11 / 14 |
| D20 | 12 / 14 | 9 / 14  |
| D21 | 13 / 14 | 13 / 14 |