

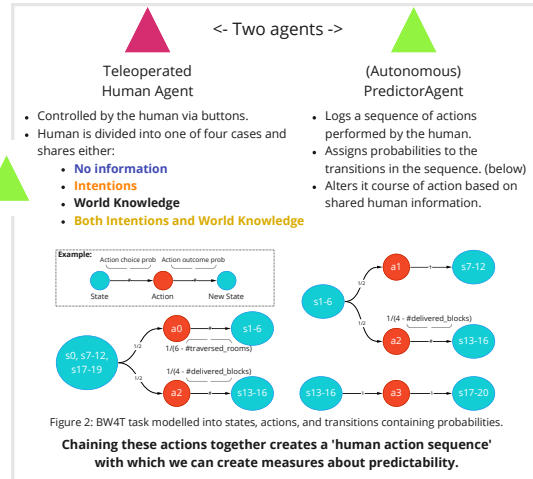
## What Information Does a Human Need to Share to be Predictable to an Agent?

Mutual predictability contributes to **mutual trust** (Johnson et al., 2021). Mutual trust is a coordinating mechanism, supporting successful teamwork (Salas et al. 2005).

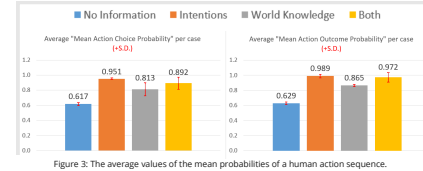
To be predictable to others means that they can **anticipate your actions** such that they can take that into consideration when **planning their own actions** (Ahrndt et al., 2016; Johnson et al., 2014).

For BW4T, the categorization used for information types is **intentions** and **world knowledge** (Jonker et al., 2012; Li et al., 2016).

## Experiment in BW4T:

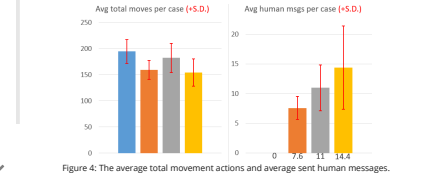


## Results:



| Information Type | Avg sequence probability | SD       | Avg possible sequences | SD          |
|------------------|--------------------------|----------|------------------------|-------------|
| No Information   | 8.35E-08                 | 1.13E-07 | 209741414.4            | 312316587.4 |
| Intentions       | 0.433                    | 0.149    | 2.8                    | 1.789       |
| World Knowledge  | 0.00612                  | 0.00841  | 547.2                  | 618.064     |
| Both Types       | 0.283                    | 0.211    | 8                      | 9.274       |

Table 1: The average probability of the taken "human action sequence" and the average "number of possible human action sequences".



## Sources:

Ahrndt, S., Fährdrich, J., and Albayrak, S. (2016). Human-agent teamwork. *Proceedings of the 31st Annual ACM Symposium on Applied Computing*, 04-08-April-2016:284-286.

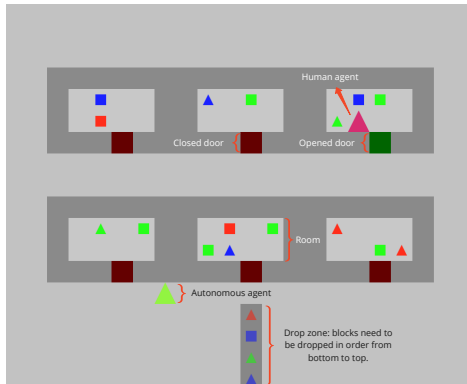
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Johnson, M., Bradshaw, J. M., Felthous, P. J., Jonker, C. M., Riemsdijk, M. B. V., and Sierhuis, M. (2014). Coactive design: Designing support for interdependence in joint activity. *Journal of Human-Robot Interaction*, 3.

Jonker, C. M., Riemsdijk, M. B. V., Kleef, I. C. V. D., and Gini, M. (2012). Compositionality of team mental models in relation to sharedness and team performance. volume 7345 LNAI, pages 242-251.

Li, S., Sun, W., and Miller, T. (2016). Communication in human-agent teams for tasks with joint action. volume 9628, pages 224-241. Springer-Verlag.

Salas, E., Sims, D. E., and Burke, C. S. (2005). Is there a "big five" in teamwork? *Small Group Research*, 36:555-599.



## Conclusions:

- (Hypothesis confirmation) Sharing **intentions** contribute to higher predictability of the human compared to sharing **no information**.
- Sharing **world knowledge** contributes less to the predictability of the human compared to sharing **intentions**.
  - (Speculation) The human experienced **task overload** due to having to send more messages in the sharing **world knowledge** case and sharing **both types** case.