

Electronic Supplementary Materials
Early emergence of metacognition in rhesus monkeys
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Supplemental results

Decisions to search

As described in the main text, our first analysis concerned monkeys' initial decisions to search the apparatus at all or not, here examining the entire sample of 141 monkeys who either searched or else engaged in a voluntary no-search decision (e.g., without social interference). Table S1 shows the predictors from the model of searching decision also including the age comparison.

| Predictor | Estimate | S.E. | z value | p value |
|--------------------------------|----------|-------|---------|----------|
| Sex (reference = Females) | -0.053 | 0.388 | -0.136 | = 0.89 |
| Condition (reference = hidden) | 2.665 | 0.564 | 4.721 | < 0.0001 |
| Age (continuous in years) | 0.028 | 0.042 | 0.655 | = 0.51 |

Table S1: Predictors of decisions to approach. Parameters are from the third model including age; the best-fit model (model 2) included condition, but did not include age as a predictor. Reference levels are indicated as relevant.

Center searches

As described in the main text, our second set of analyses concerned the patterns of searches for those monkeys' who did choose to search (e.g., the 80 monkeys from the total sample who did so). Table S2 shows the predictors of center information-seeking (versus approaching the side) from the full model including age, condition, and their interaction.

| Predictor | Estimate | S.E. | z value | p value |
|--------------------------------|----------|-------|---------|----------|
| Sex (reference = Females) | 0.853 | 0.912 | 0.935 | = 0.35 |
| Condition (reference = hidden) | -7.807 | 2.005 | -3.894 | < 0.0001 |
| Age (continuous in years) | -0.021 | 0.124 | -0.173 | = 0.86 |
| Age X Condition | 0.296 | 0.170 | 1.736 | = 0.083 |

Table S2: Predictors of center searching. Parameters are from the fourth (full) model including an interaction between *age X condition*, which was the best fitting model by AIC comparisons. Reference levels are indicated as relevant.

Looking inside apparatus

As described in the main text, our next analysis concerned the specific response of looking inside the tubes, for those monkeys' who did search. Table S3 shows the predictors of this looking response from the full model.

| Predictor | Estimate | S.E. | z value | p value |
|--------------------------------|----------|-------|---------|---------|
| Sex (reference = Females) | 0.680 | 1.097 | 0.620 | = 0.54 |
| Age (continuous in years) | 0.082 | 0.104 | 0.789 | = 0.43 |
| Condition (reference = hidden) | -2.694 | 1.171 | -2.301 | = 0.021 |
| Center search (reference = no) | 4.165 | 1.268 | 3.284 | = 0.001 |

Table S3: Predictors of looking responses. Parameters are from the third model including both condition and whether the monkey engaged in a center search or not; the additional inclusion of a *condition X center search* interaction did not improve fit further. Reference levels are indicated as relevant.

Latency to search

As described in the main text, our final analysis concerned latency to search for those monkeys' who did approach (examining the 80 monkeys who did so). Table S4 shows the predictors of latency from the full model.

| Predictor | Estimate | S.E. | z value | p value |
|--------------------------------|----------|-------|---------|----------|
| Sex (reference = Females) | -0.384 | 0.145 | -2.640 | = 0.01 |
| Condition (reference = hidden) | -1.054 | 0.269 | -3.919 | = 0.0002 |
| Age (continuous in years) | -0.064 | 0.021 | -3.092 | = 0.003 |
| Age X Condition | 0.050 | 0.026 | 1.905 | = 0.061 |

Table S4: Predictors of search latency. Parameters are from the fourth (full) model including an interaction between *age X condition*, which was the best fitting model by AIC comparisons. Reference levels are indicated as relevant.

Supplemental Video Caption

Video S1: Experimental demonstrations and example monkey responses. The first clip shows the *visible* control condition demonstration from the monkey's perspective. Here, the experimenter baited an array of tubes behind an occluder, but a grape was left visibly on top of one of the tubes when she removed the occluder. The second clip shows the *hidden* condition demonstration from the monkey's perspective. This involved an identical demonstration from the experimenter, but there was no food left on the apparatus when she removed the occluder. As such, information seeking by looking into the tubes was necessary in this context. The third clip shows an example of a monkey searching on the side of the apparatus. As was typical in the visible condition, the monkey first approaches the baited side and removes the visible grape on top of the apparatus. The fourth clip shows an example of a monkey searching in the center of the apparatus. Here, the monkey first approaches the center vantage point, where they then look into both tubes. Finally, the fifth clip shows an example of a monkey's voluntary no-search response (e.g., in the absence of social interference). While this monkey observed the full demonstration, they did not choose to search the apparatus. Note that this monkey did not search for the full one-minute trial period, but the clip only shows the first 30s of the trial.