**Supplementary Materials for**

The Neural Basis of Conceptualizing the Same Action at Different Levels of Abstraction

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**Supplementary Methods**

 **Sample Size Determination**

A power analysis of the Why > How contrast from Study 3 of Spunt and Adolphs (2014) indicated the present study's sample size was sufficiently large to test our primary hypotheses. We based our power analysis on that study because it was conducted using the same scanner, sequence, and preprocessing pipeline as those used in the present study. The power analysis was performed using the open-source software fmripower (<http://mumford.fmripower.org/>) operating in MATLAB (version 2014b; MathWorks Inc., Natick, MA, USA). Across the 10 regions used in the region-of-interest anlayses reported in the main text (see Figure 2 in main text and Table S2 below for ROI details), 90% detection power for the Why > How contrast required an average of only 8.90 subjects (SD = 3.84, Maximum = 15).

**Table S1**

Action phrases included in the study listed in the order of increasing Level of Abstraction (LOA). To facilitate comparability, all semantic dimensions (columns 1-6) have been rescaled to 0 – 1.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Phrase | LOA | Abstract | Non-imageable | Broad | Mind | Arousing | N Chars | N Words | Freq |
|  |  |  |  |  |  |  |  |  |  |
| turn a doorknob | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 13 | 3 | 2.99 |
| click a mouse | 0.02 | 0.00 | 0.02 | 0.01 | 0.08 | 0.05 | 11 | 3 | 2.62 |
| grab a pencil | 0.03 | 0.02 | 0.04 | 0.02 | 0.05 | 0.01 | 11 | 3 | 3.12 |
| crack eggs | 0.04 | 0.02 | 0.00 | 0.04 | 0.06 | 0.13 | 9 | 2 | 3.09 |
| clap hands | 0.04 | 0.00 | 0.01 | 0.03 | 0.03 | 0.45 | 9 | 2 | 3.16 |
| raise a hand | 0.05 | 0.04 | 0.02 | 0.06 | 0.03 | 0.13 | 10 | 3 | 3.76 |
| fasten seatbelt | 0.05 | 0.01 | 0.02 | 0.01 | 0.08 | 0.36 | 14 | 2 | 1.96 |
| brush one's hair | 0.05 | 0.03 | 0.05 | 0.05 | 0.05 | 0.13 | 14 | 3 | 3.25 |
| cut paper | 0.07 | 0.04 | 0.05 | 0.10 | 0.08 | 0.03 | 8 | 2 | 3.87 |
| take aspirin | 0.07 | 0.03 | 0.05 | 0.03 | 0.14 | 0.16 | 11 | 2 | 3.79 |
| wash one's hands | 0.07 | 0.07 | 0.04 | 0.04 | 0.06 | 0.32 | 14 | 3 | 3.66 |
| open a bottle | 0.07 | 0.04 | 0.04 | 0.14 | 0.05 | 0.11 | 11 | 3 | 3.72 |
| drink coffee | 0.07 | 0.03 | 0.02 | 0.08 | 0.09 | 0.35 | 11 | 2 | 3.83 |
| use a comb | 0.08 | 0.03 | 0.05 | 0.15 | 0.06 | 0.09 | 8 | 3 | 3.18 |
| sign one's name | 0.08 | 0.06 | 0.04 | 0.05 | 0.15 | 0.06 | 13 | 3 | 4.02 |
| use scissors | 0.08 | 0.04 | 0.06 | 0.14 | 0.10 | 0.04 | 11 | 2 | 3.36 |
| throw away trash | 0.08 | 0.06 | 0.04 | 0.11 | 0.06 | 0.30 | 14 | 3 | 3.74 |
| open a magazine | 0.09 | 0.05 | 0.06 | 0.15 | 0.06 | 0.16 | 13 | 3 | 3.64 |
| lift weights | 0.09 | 0.04 | 0.07 | 0.18 | 0.00 | 0.45 | 11 | 2 | 2.57 |
| go jogging | 0.10 | 0.08 | 0.08 | 0.10 | 0.04 | 0.47 | 9 | 2 | 3.52 |
| clip coupons | 0.10 | 0.04 | 0.05 | 0.14 | 0.13 | 0.20 | 11 | 2 | 2.05 |
| drink wine | 0.10 | 0.04 | 0.05 | 0.10 | 0.15 | 0.36 | 9 | 2 | 3.64 |
| lift a glass | 0.11 | 0.02 | 0.05 | 0.30 | 0.03 | 0.12 | 10 | 3 | 3.25 |
| use a remote | 0.11 | 0.08 | 0.04 | 0.16 | 0.14 | 0.04 | 10 | 3 | 3.52 |
| press buttons | 0.12 | 0.05 | 0.08 | 0.25 | 0.07 | 0.06 | 12 | 2 | 2.83 |
| point a camera | 0.12 | 0.09 | 0.08 | 0.12 | 0.14 | 0.19 | 12 | 3 | 3.24 |
| write a check | 0.12 | 0.06 | 0.04 | 0.14 | 0.22 | 0.18 | 11 | 3 | 3.65 |
| use a brush | 0.12 | 0.08 | 0.06 | 0.24 | 0.08 | 0.12 | 9 | 3 | 3.39 |
| wear ties | 0.13 | 0.06 | 0.16 | 0.20 | 0.07 | 0.18 | 8 | 2 | 3.11 |
| stir ingredients | 0.13 | 0.07 | 0.09 | 0.25 | 0.07 | 0.16 | 15 | 2 | 2.21 |
| use chalk | 0.13 | 0.08 | 0.06 | 0.24 | 0.12 | 0.08 | 8 | 2 | 3.22 |
| enter a classroom | 0.13 | 0.10 | 0.10 | 0.22 | 0.07 | 0.16 | 15 | 3 | 2.77 |
| open a browser | 0.14 | 0.10 | 0.08 | 0.13 | 0.20 | 0.09 | 12 | 3 | 2.52 |
| dial numbers | 0.14 | 0.09 | 0.06 | 0.25 | 0.14 | 0.03 | 11 | 2 | 2.91 |
| take pills | 0.15 | 0.08 | 0.08 | 0.26 | 0.12 | 0.29 | 9 | 2 | 4.04 |
| pack a bag | 0.17 | 0.10 | 0.11 | 0.28 | 0.18 | 0.14 | 8 | 3 | 3.38 |
| consume alcohol | 0.17 | 0.08 | 0.14 | 0.22 | 0.18 | 0.42 | 14 | 2 | 2.48 |
| make a phone call | 0.19 | 0.12 | 0.06 | 0.18 | 0.35 | 0.16 | 14 | 4 | 4.30 |
| use a camera | 0.20 | 0.11 | 0.09 | 0.24 | 0.27 | 0.26 | 10 | 3 | 3.82 |
| give applause | 0.20 | 0.19 | 0.09 | 0.21 | 0.14 | 0.67 | 12 | 2 | 3.77 |
| take a picture | 0.20 | 0.14 | 0.06 | 0.24 | 0.27 | 0.34 | 12 | 3 | 4.40 |
| consume medicine | 0.20 | 0.12 | 0.15 | 0.34 | 0.16 | 0.31 | 15 | 2 | 2.63 |
| consume caffeine | 0.21 | 0.14 | 0.27 | 0.28 | 0.13 | 0.29 | 15 | 2 | 2.10 |
| mix a cocktail | 0.21 | 0.09 | 0.19 | 0.36 | 0.17 | 0.37 | 12 | 3 | 2.73 |
| play piano | 0.22 | 0.11 | 0.12 | 0.16 | 0.40 | 0.46 | 9 | 2 | 3.63 |
| make breakfast | 0.22 | 0.12 | 0.12 | 0.36 | 0.20 | 0.42 | 13 | 2 | 4.18 |
| use credit cards | 0.23 | 0.14 | 0.12 | 0.29 | 0.29 | 0.37 | 14 | 3 | 3.64 |
| serve alcohol | 0.23 | 0.13 | 0.22 | 0.39 | 0.15 | 0.27 | 12 | 2 | 3.10 |
| watch television | 0.27 | 0.17 | 0.04 | 0.23 | 0.52 | 0.32 | 15 | 2 | 3.70 |
| dress formally | 0.27 | 0.22 | 0.20 | 0.37 | 0.19 | 0.35 | 13 | 2 | 2.54 |
| write an email | 0.28 | 0.16 | 0.15 | 0.23 | 0.53 | 0.11 | 12 | 3 | 2.88 |
| prepare meals | 0.29 | 0.13 | 0.24 | 0.50 | 0.25 | 0.36 | 12 | 2 | 2.92 |
| go shopping | 0.32 | 0.24 | 0.23 | 0.47 | 0.25 | 0.42 | 10 | 2 | 4.09 |
| make a list | 0.33 | 0.18 | 0.17 | 0.39 | 0.52 | 0.20 | 9 | 3 | 4.22 |
| paint a picture | 0.34 | 0.22 | 0.19 | 0.39 | 0.44 | 0.50 | 13 | 3 | 3.41 |
| build muscles | 0.34 | 0.24 | 0.47 | 0.53 | 0.03 | 0.65 | 12 | 2 | 2.98 |
| attend a school | 0.35 | 0.26 | 0.27 | 0.38 | 0.40 | 0.41 | 13 | 3 | 3.54 |
| make a purchase | 0.37 | 0.23 | 0.22 | 0.61 | 0.35 | 0.27 | 13 | 3 | 3.54 |
| ingest nutrients | 0.38 | 0.26 | 0.60 | 0.57 | 0.06 | 0.37 | 15 | 2 | 1.47 |
| provide food | 0.41 | 0.26 | 0.40 | 0.59 | 0.26 | 0.62 | 11 | 2 | 3.42 |
| follow recipes | 0.42 | 0.33 | 0.30 | 0.41 | 0.56 | 0.27 | 13 | 2 | 2.93 |
| hold a party | 0.43 | 0.33 | 0.35 | 0.47 | 0.41 | 0.61 | 10 | 3 | 4.19 |
| read articles | 0.43 | 0.28 | 0.20 | 0.42 | 0.75 | 0.19 | 12 | 2 | 3.29 |
| arrive on time | 0.45 | 0.42 | 0.53 | 0.27 | 0.41 | 0.68 | 12 | 3 | 3.99 |
| kill germs | 0.45 | 0.39 | 0.62 | 0.50 | 0.19 | 0.49 | 9 | 2 | 3.25 |
| contact a friend | 0.45 | 0.35 | 0.36 | 0.40 | 0.51 | 0.66 | 14 | 3 | 3.71 |
| send a message | 0.46 | 0.38 | 0.31 | 0.59 | 0.48 | 0.15 | 12 | 3 | 3.82 |
| make a donation | 0.47 | 0.34 | 0.36 | 0.48 | 0.51 | 0.73 | 13 | 3 | 3.55 |
| satisfy hunger | 0.48 | 0.47 | 0.40 | 0.56 | 0.29 | 0.70 | 13 | 2 | 2.46 |
| give a lecture | 0.48 | 0.36 | 0.38 | 0.46 | 0.66 | 0.26 | 12 | 3 | 3.69 |
| write a poem | 0.49 | 0.35 | 0.39 | 0.38 | 0.74 | 0.47 | 10 | 3 | 3.33 |
| give to charity | 0.50 | 0.36 | 0.51 | 0.47 | 0.53 | 0.76 | 13 | 3 | 3.85 |
| get fit | 0.51 | 0.44 | 0.52 | 0.72 | 0.17 | 0.84 | 6 | 2 | 4.16 |
| teach a class | 0.52 | 0.42 | 0.36 | 0.50 | 0.64 | 0.45 | 11 | 3 | 3.67 |
| write a song | 0.52 | 0.36 | 0.48 | 0.41 | 0.73 | 0.51 | 10 | 3 | 3.74 |
| participate in class | 0.53 | 0.45 | 0.37 | 0.51 | 0.64 | 0.40 | 18 | 3 | 3.06 |
| get a job | 0.54 | 0.41 | 0.58 | 0.53 | 0.51 | 0.71 | 7 | 3 | 4.85 |
| show cleanliness | 0.57 | 0.55 | 0.58 | 0.64 | 0.35 | 0.60 | 15 | 2 | 2.85 |
| finish a job | 0.58 | 0.46 | 0.68 | 0.62 | 0.43 | 0.75 | 10 | 3 | 3.98 |
| get a degree | 0.61 | 0.40 | 0.59 | 0.60 | 0.71 | 0.84 | 10 | 3 | 4.12 |
| make art | 0.64 | 0.55 | 0.39 | 0.85 | 0.55 | 0.67 | 7 | 2 | 4.19 |
| help a person | 0.65 | 0.57 | 0.56 | 0.77 | 0.47 | 0.92 | 11 | 3 | 4.31 |
| save money | 0.66 | 0.52 | 0.65 | 0.55 | 0.71 | 0.86 | 9 | 2 | 4.21 |
| get a promotion | 0.66 | 0.53 | 0.77 | 0.50 | 0.67 | 0.98 | 13 | 3 | 4.06 |
| live a long life | 0.67 | 0.63 | 0.81 | 0.63 | 0.41 | 0.95 | 13 | 4 | 4.32 |
| obey laws | 0.69 | 0.63 | 0.73 | 0.58 | 0.69 | 0.40 | 8 | 2 | 2.80 |
| entertain others | 0.72 | 0.71 | 0.56 | 0.81 | 0.54 | 0.64 | 15 | 2 | 3.10 |
| teach others | 0.73 | 0.66 | 0.54 | 0.77 | 0.70 | 0.69 | 11 | 2 | 3.64 |
| reduce pain | 0.73 | 0.68 | 0.87 | 0.74 | 0.46 | 0.62 | 10 | 2 | 3.02 |
| make a friend | 0.73 | 0.70 | 0.73 | 0.62 | 0.63 | 0.85 | 11 | 3 | 4.59 |
| avoid diseases | 0.75 | 0.71 | 0.99 | 0.77 | 0.40 | 0.58 | 13 | 2 | 2.69 |
| seek advice | 0.76 | 0.72 | 0.67 | 0.75 | 0.76 | 0.25 | 10 | 2 | 3.18 |
| support a cause | 0.77 | 0.71 | 0.73 | 0.74 | 0.68 | 0.71 | 13 | 3 | 3.60 |
| show an ability | 0.77 | 0.70 | 0.74 | 0.91 | 0.52 | 0.64 | 13 | 3 | 3.59 |
| stay alert | 0.77 | 0.76 | 0.71 | 0.68 | 0.76 | 0.44 | 9 | 2 | 3.19 |
| express a talent | 0.78 | 0.74 | 0.71 | 0.90 | 0.54 | 0.71 | 14 | 3 | 2.93 |
| show courtesy | 0.79 | 0.80 | 0.62 | 0.75 | 0.69 | 0.79 | 12 | 2 | 3.41 |
| show appreciation | 0.81 | 0.82 | 0.62 | 0.81 | 0.67 | 0.82 | 16 | 2 | 3.31 |
| entertain oneself | 0.82 | 0.75 | 0.70 | 0.96 | 0.68 | 0.58 | 16 | 2 | 2.27 |
| express doubt | 0.84 | 0.84 | 0.74 | 0.76 | 0.82 | 0.42 | 12 | 2 | 2.88 |
| satisfy a need | 0.85 | 0.82 | 0.83 | 0.96 | 0.56 | 0.64 | 12 | 3 | 2.99 |
| impress others | 0.85 | 0.85 | 0.85 | 0.89 | 0.59 | 0.56 | 13 | 2 | 3.21 |
| plan ahead | 0.85 | 0.78 | 0.76 | 0.76 | 0.90 | 0.57 | 9 | 2 | 2.14 |
| feel well | 0.86 | 0.87 | 0.76 | 0.87 | 0.65 | 0.87 | 8 | 2 | 3.85 |
| pass the time | 0.86 | 0.88 | 0.85 | 0.99 | 0.60 | 0.14 | 11 | 3 | 4.30 |
| show competence | 0.87 | 0.84 | 0.85 | 0.82 | 0.71 | 0.77 | 14 | 2 | 2.92 |
| show humility | 0.87 | 0.84 | 0.81 | 0.81 | 0.81 | 0.57 | 12 | 2 | 3.14 |
| share ideas | 0.88 | 0.85 | 0.74 | 0.85 | 0.81 | 0.65 | 10 | 2 | 3.36 |
| avoid mistakes | 0.89 | 0.83 | 0.99 | 0.83 | 0.74 | 0.53 | 13 | 2 | 3.07 |
| express an idea | 0.89 | 0.88 | 0.74 | 0.88 | 0.80 | 0.62 | 13 | 3 | 3.50 |
| spread joy | 0.90 | 0.87 | 0.78 | 0.95 | 0.68 | 0.95 | 9 | 2 | 3.08 |
| spread knowledge | 0.90 | 0.86 | 0.82 | 0.87 | 0.79 | 0.77 | 15 | 2 | 3.11 |
| show creativity | 0.91 | 0.86 | 0.77 | 1.00 | 0.75 | 0.76 | 14 | 2 | 3.09 |
| avoid boredom | 0.91 | 0.88 | 0.92 | 0.93 | 0.76 | 0.37 | 12 | 2 | 2.57 |
| achieve success | 0.92 | 0.86 | 0.87 | 0.96 | 0.68 | 1.00 | 14 | 2 | 2.86 |
| feel sociable | 0.92 | 0.94 | 0.81 | 0.84 | 0.83 | 0.63 | 12 | 2 | 3.10 |
| show ambition | 0.92 | 0.89 | 0.96 | 0.85 | 0.78 | 0.68 | 12 | 2 | 3.32 |
| show intelligence | 0.93 | 0.87 | 0.83 | 0.84 | 0.89 | 0.78 | 16 | 2 | 3.59 |
| feel productive | 0.93 | 0.91 | 0.86 | 0.85 | 0.78 | 0.87 | 14 | 2 | 3.29 |
| improve oneself | 0.93 | 0.92 | 0.83 | 0.99 | 0.65 | 0.93 | 14 | 2 | 2.33 |
| gain knowledge | 0.94 | 0.87 | 0.76 | 0.91 | 0.93 | 0.87 | 13 | 2 | 2.91 |
| keep a memory | 0.94 | 0.91 | 0.93 | 0.72 | 1.00 | 0.58 | 11 | 3 | 3.97 |
| show intellect | 0.96 | 0.88 | 0.85 | 0.94 | 0.89 | 0.76 | 13 | 2 | 3.12 |
| reduce worry | 0.96 | 0.92 | 1.00 | 0.84 | 0.86 | 0.62 | 11 | 2 | 2.40 |
| feel nostalgia | 0.96 | 1.00 | 0.84 | 0.79 | 0.96 | 0.54 | 13 | 2 | 3.04 |
| feel secure | 0.97 | 0.95 | 0.86 | 0.88 | 0.88 | 0.86 | 10 | 2 | 3.62 |
| feel connected | 0.99 | 0.97 | 0.92 | 0.95 | 0.85 | 0.72 | 13 | 2 | 3.21 |
| increase wisdom | 1.00 | 0.94 | 0.90 | 0.91 | 0.95 | 0.88 | 14 | 2 | 2.62 |
|  |  |  |  |  |  |  |  |  |  |

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**Figure S1**

Surface rendering of regions associated with longer response time (RT). Regions were identified in a whole-brain search conducted with a cluster-forming threshold of p < .001, followed by cluster-correction at a family-wise error rate of .05. Rendering created using the SurfPlot Tool (<http://mrtools.mgh.harvard.edu/index.php/SurfPlot>). Left hemisphere is left.



**Appendix A**. Instructions used for normative data collection.

**Normative Responses to Why/How Questions**

**Scale**: Yes, No

**Instructions for Why-Questions**: People often justify their actions with reasons. You will judge the acceptability of reasons for actions. For each judgment, you will see a unique pairing of a reason with an action. For example: "Q: Why ride a bike? A: Exercise." In this example, your task would be to judge whether or not the phrase "exercise" describes a commonly accepted reason for the action described by "ride a bike". If you think it is a commonly accepted reason, then answer 'Yes'. If you think it isn't a commonly accepted reason, then answer 'No'.

**Instructions for How-Questions**: The actions we perform typically have many parts that collectively describe how to perform the action. For example, consider the action of "brushing one's teeth". Parts of this action commonly include "grab a toothbrush", "apply toothpaste", and "rinse one's mouth". Below you will see a series of questions about how to perform a variety of different actions. Each question is followed by an answer. For example: "Q: How to brush one's teeth? A: Apply toothpaste." In this example, your task would be to judge whether or not the phrase "apply toothpaste" describes a commonly accepted part of the action described by "brush one's teeth". If you think it is a commonly accepted part, then answer 'Yes'. If you think it isn't a commonly accepted part, then answer 'No'.

**Abstract/Concrete**

**Scale**: 1 = Completely Abstract, 4 = Equally Concrete and Abstract, 7 = Completely Concrete

Below are a number of phrases that can be used to describe aspects of human action. You will rate how concrete versus abstract each phrase is on a scale from 1 to 7. To make sure you understand what we mean by “concrete” and "abstract", please keep the following dictionary definitions in mind when making your ratings:

• Concrete: existing in a material or physical form; real or solid; not abstract

• Abstract: existing in thought or as an idea but not having a physical or concrete existence

If you think a phrase is completely concrete, rate it as a 7 (completely concrete). If instead you think it is completely abstract, rate it as a 1 (completely abstract). If you think it is as concrete as it is abstract, rate it as a 4 (equally concrete and abstract). The other numbers represent intermediate points on the scale. Please use the entire range of the scale when making your ratings.

**Non-imageable/Imageable**

**Scale**: 1 = Very difficult to image, 3 = Fairly difficult to image, 5 = Fairly easy to image, 7 = Very easy to image

Below are a number of phrases that could be used to describe a person's action. For each phrase, use the scale provided to rate how easily it evokes a mental image of what it would be like to perform the action. For example, consider the phrase "brushing one's teeth". This phrase might evoke a visual image of a toothbrush, the taste of toothpaste in your mouth, and/or the feeling of gripping a toothbrush in your hands and moving it back and forth in your mouth. If for a given phrase images like these arise quickly and easily, regardless of what sense they refer to, then rate it a 7 (very easy to image). If instead the phrase evokes no mental image or only does so with great difficulty, then rate it a 1 (very difficult to image).

Even if you've never performed the action described by the phrase, it could still evoke mental images. For instance, many people have never performed the action described by "fire a gun", but the phrase still likely evokes mental images in these people, for instance, an image of what a gun looks like or what a gunshot sounds like.

**Broad/Specific**

**Scale**: 1 = Very Broad, 3 = Fairly Broad, 5 = Fairly Specific, 7 = Very Specific

Below are a number of phrases that could be used to describe a person's action. Some of these phrases are very specific. Take for example the phrase "Pick up a pencil". This phrase is very specific in that there are only a few ways in which a person might pick up a pencil. In other words, the phrase "Pick up a pencil" leaves little to the imagination. In contrast, consider a phrase like "Express creativity". This phrase is very broad in that there are a large number of ways in which a person might express themselves. In other words, the phrase "Express creativity" leaves a lot to the imagination.

Use the scale provided to rate how broad vs. specific each phrase is. Please consider the entire range of the scale when making your ratings.

**Mind/Body**

**Scale**: 1 = Only Mind, 3 = Mostly Mind, 5 = Mostly Body, 7 = Only Body

Actions involve the actors' mind and the actor's body. Because of this, actions can be described in ways that highlight either the state of mind of the actor or the specific bodily actions that the actor is using to perform the action. Below are phrases that could be be used to describe a person's action. You will rate the extent to which each phrase highlights the role of the actor's mind versus their body in performing the action.

Please consider the entire range of the scale when making your ratings. In other words, do not assume that the phrase must refer to either the mind or the body. Instead, try to be thoughtful about the subtle differences among the descriptions that would suggest more or less involvement of the mind relative to the body and vice versa.

NOTE: If you don't believe that the mind is actually different than the body or if you simply don't fullly know what I mean by 'mind' and 'body', then feel free to assume that by 'mind' I mean the actor's brain and by 'body' I mean everything other than the actor's brain.

**Positive/Negative (Emotional/Neutral)**

**Scale**: 1 = Positive, 4 = Neutral, 7 = Negative

Below are a number of brief English phrases. Read each phrase and consider the extent to which it evokes feelings that are positive vs. negative. Please consider the entire range of the scale when making your ratings.

**Supplementary References**

Eickhoff, S, Stephan, K, Mohlberg, H, Grefkes, C, Fink, G, Amunts, K, Zilles, K. 2005. A new spm toolbox for combining probabilistic cytoarchitectonic maps and functional imaging data. NeuroImage 25:1325–1335.

Spunt, R, Adolphs, R. 2014. Validating the why/how contrast for functional mri studies of theory of mind. Neuroimage 99:301–311.