Meaningless Gesture Imitation Coding Rules
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For data relevant to task validity, see e.g., Metzgar, Stoll, Grafton, Buxbaum, & Garcea, 2022; Isaacs, Buxbaum, & Wong, 2022; Tarhan, Watson, & Buxbaum, 2015; and Buxbaum, Shapiro, & Coslett, 2014. All coders are trained to > 85% inter-rater agreement (Cohen's Kappa).

General Coding Instructions
If participant performs gesture more than once, code for the best iteration of each item. Therefore, if there is an error that is corrected for at least one iteration, give full credit. The exception is if the correct component was only a 'fleeting' part of the overall gesture. Below are item-level elements that are required for meaningless gesture production to be scored as accurate. The parenthetical labels serve as a reference to the meaningful gestures from which these meaningless gestures were derived; aspects of Hand Posture (HP) or Kinematics (KIN) were analogous across the meaningful and meaningless gestures.

Video 0, Item 1 (watch)
Hand Posture (HP):
- Must pinch with pointer, middle, and thumb
  - Thumb needs to touch these fingers
- If thumb moves, this is ok
- Some movement in ring and pinky allowed
  - Most movement should be in pointer and middle
- Ring and pinky may be either extended or curled down

Kinematics (KIN):
- Arm must be in front of body
- Excessive arm movement is a KIN error
- Fingers must separate at least an inch

Video 1, Item 2 (toothbrush)
HP:
- Fingers need to be at least somewhat spaced, no closed hand
  - Not all fingers need to be spaced, be lenient
- Slight finger curling is acceptable

KIN:
- Palm needs to be aimed toward face
- Some lateral arm movement needed
- Hand should not be higher than top of the head or lower than below the chin for the whole gesture, can fall below or above within a single iteration if the rest of the movement is in the acceptable range
- Hand must start in line with the face

- Oscillations should not be larger than 8"

Video 2, Item 3 (screwdriver)
HP:
- Fingers should be closed; be lenient
- Must have wrist/arm movement
- Thumb placement not important

KIN:
- Elbow should be mostly stationary, most of the movement should be in the wrist
- Arm should be positioned in space in front of participant
- Hand should rotate about 90 degrees
- Acceptable if the hand flips over

Video 3, Item 4 (scissors)
HP:
- Must open and close fist

KIN:
- There should be some movement forward for each fist closure
- There should be a reasonable effort to extend, but full extension is not necessary

- Should not include excessive vertical arm movement
- Forward movement should be roughly in sync with hand movement

Video 4, Item 5 (saw)
HP:
- Fingers should be spread out
- Wrist does not need to be pointed out
- Hand should be static

KIN:
- Forward movement needed
- Elbow needs to start bent
- Forearm must be roughly parallel with the table
- Palm should be facing correct direction, if not this is a KIN/arm posture error
- Arm does not need to fully extend, but needs to move forward
- Arm should move at least 4"

Video 5, Item 6 (razor)
HP:
- Hand should be closed, fingers should not be spread more than slightly
- Either hand cupped or wrist bent, cannot have straight hand
- Wrist should be static

KIN:
- Hand should not touch face (fleeting touch of face is acceptable)
- Hand should be within 2-6" of face

- Arm should move to both sides of face
- Hand should be facing the correct direction (with thumb closest to face), forearm needs to be turned
- Acceptable range is below top of head to just below chin
  - Should not move arm more than 4-8"

Video 6, Item 7 (nail clippers)
HP:
- Ideal: pointer and middle aim down, thumb sticks out
- Acceptable if there is some movement in other fingers
- Pinky and ring finger can be extended
- Tucked thumb okay, does not need to stick out
- No pinching (thumb to fingers)

KIN:
- Ideal: starts straight out, rotates about 90 degrees toward middle
- If there is no rotation, this is a KIN/arm posture error
- Some elbow movement is acceptable
- Some rotation of the arm is desireable, Rotation does not need to be in sync with hand movements

Video 7, Item 8 (lighter)
HP:
- Must stick out index finger only
- Other fingers must be stationary
- Thumb placement does not matter
- Must make fist before sticking out finger

KIN:
- Hand should be at midline, not higher than the head
- Forearm should be somewhat parallel to table
- Arm should be mostly stationary
  - Slight movement forward is acceptable, must be flagrant to warrant an error
- Palm needs to be facing table
- Placement of elbow not very important

Video 8, Item 9 (hammer)
HP:
- Fingers spread out
- Hand/wrist should be stationary
  - Slight wrist movement acceptable

KIN:
- Hand should be facing correct direction, if not this is a KIN/arm posture error
- Hand should start at shoulder and move towards table
- There should be a reasonable effort to extend, but full extension is not necessary

Video 9, Item 10 (fork)
HP:
- Fingers spread out
- Hand/wrist should be static
    - Some slight wrist movement is acceptable

KIN:
- Hand should be completely below top of head
- Hand should be at least partially above chin, can be completely above chin
- Palm should be positioned towards face
- Any beginning or end movements are acceptable as long as participant lifts hand normally (do not need to begin or return to the center of the table)

Video 10, Item 11 (eraser)
HP:
- Must make fist, must be closed the entire time
- Must oscillate with either wrist or arm, if there is no oscillation this is HP error

KIN:
- Must oscillate with either wrist or arm, if there is no oscillation this is KIN error
- Must move from their right to their left
- Hand should not move above the shoulder, should not hit table
    - If one iteration does hit table, give credit
- Oscillations should not be larger than 4-8"

Video 11, Item 12 (comb)
HP:
- Fingers should be closed (be lenient)
- Wrist/hand should be static

KIN:
- Hand must be positioned between 2-12" from head
    - Start of hand position - palm must be between top of head and chin, fingers may be above head
- Palm should be facing camera
- Arm should move up and down, not back/forth
    - Be lenient, some diagonal acceptable
- Hand should move about 3 – 10"

Video 12, Item 13 (bottle opener)
HP:
- Ideally pointer finger is sticking out with slight curve, thumb tucked, movement mostly in wrist, finger points up with thumb on top
- As long as pointer finger and thumb are the only ones sticking out this is ok
- Must be some wrist movement

KIN:
- Ideally forearm is pointing upward, arm positioned so that hand is at midline

- Arm should be close to parallel with body (be lenient)
- Arm movement more than 8" is KIN error

Video 13, Item 14 (drinking/beer mug)
HP:
- Open fingers; be lenient (any spacing between any fingers is acceptable)
- Pinky toward table and thumb on top
- Fingers should be straight, not curled

KIN:
- Arm straight out in front, bring hand up towards face
- Elbow should stay in the same spot
- Any beginning or end movements are okay as long as participant lifts hand normally (do not need to begin or return to the center of the table)
- Hand should be within 3" of table and brought up to about midway through face
  - Okay if hand hits table
- Hand should not pass over nor completely under head