Reliability and Validity of the Home Handedness Questionnaire

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Background and Aims

- Handedness is a frequently used behavioral marker of lateralization in neuroscience and psychology, with ~85% of adults being right handed. [1-3]
- The Edinburgh Handedness Inventory (EHI) is the most widely used adult handedness questionnaire.[2] However, the EHI mixes different manual skill types and has insufficient items to statistically determine handedness.
- **Aims:** Develop a performance-based measure of hand preference to: **1)** compare preferences for unimanual and role-differentiated bimanual manipulation (RDBM), **2)** sample actions sufficiently to statistically determine handedness, **3)** test if our new measure replicates prior adult research, and **4)** analyze the validity and reliability of our new measure.

Methods

- **Participants:** FIU undergraduates (*N* = 862; 715 female) recruited via FIU SONA Systems. Data was collected online using Qualtrics.
- **Home Handedness Questionnaire (HHQ):** 30 actions per skill type: unimanual actions using one hand (**Figure 1a**), and RDBM actions where one hand stabilizes an object for the other hand's manipulation (**Figure 1b**). Participants performed each action twice and self-reported which hand they used per action.

Figure 1a: Unimanual action
1b: RDBM action

- **Edinburgh Handedness Inventory (EHI):** Includes 10 activities that mix unimanual and RDBM actions.[4]
- **Handedness Index (HI) for the HHQ:** HI scores were computed for HHQ-unimanual and HHQ-RDBM subscales using [*HI=(R-L)/(R+L)]*. Hand preference was determined using binomial *z*-scores where z < -1.96 = left preference, *z* > 1.96 = right preference, and all other *z*-scores = no preference.
- **Handedness Index (HI) for the EHI:** [*HI*=100x*(R-L)/(R+L)]* was used in conjunction with cut-off scores: >0 = right preference, scores <0 = left preference, and 0 = no preference according to standard practice.
- **Analyses:** One-sample *t*-tests were performed on HHQ-HI and EHI-HI scores to assess population-level bias for hand use. To test convergent validity, correlations between HI scores for HHQ-unimanual and HHQ-RDBM to EHI scores were conducted. To test internal reliability of the HHQ, a Kuder-Richardson-20 (KR-20) analysis was performed.

Results and Discussion

One Sample T-Test Results

- A significant right-hand preference for HHQ-unimanual actions was found, $t(861) = 43.04$, $p < .001$.
- There was also a significant right-hand preference for HHQ-RDBM, $t(861)=36.18$, $p < .001$.
- A significant right-hand preference on the EHI was found, $t(861) = 31.56$, $p < .001$.
- See **Figure 2** for a distribution of hand preferences by measure.

HHQ Validity and Reliability Results

- Significant positive correlation for HHQ-unimanual and EHI, $r = .574$, $p < .001$.
- EHI scores and HHQ-RDBM scores were positively correlated $r=.500$, $p<.001$.
- HHQ-unimanual and HHQ-RDBM scores were also correlated $r=.671$, $p<.001$.
- High internal reliability was found for the full HHQ (KR_{20} = .95), and within each sub scale (HHQ-unimanual: KR_{20} = .91; HHQ-RDBM: KR_{20} = .94.

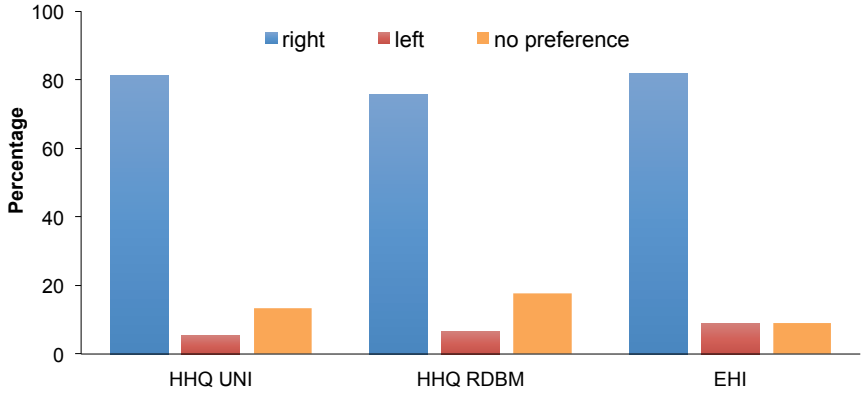

Figure 2. Hand preference percentages per measure

Take-Home Points:

✓ The HHQ demonstrated validity with the EHI, high internal reliability and replicated previous findings.

✓ The HHQ distinguishes between unimanual and RDBM actions, while utilizing statistical cut offs for hand preference instead of arbitrary separations used by EHI.

✓ Future directions: Test the utility of the HHQ across different ages to answer developmental questions about hand preferences for different manual skills and their relation to cognition.

References and Acknowledgements

[1] Annett, M (2002) ISBN 9781134950744
[2] Nelson et al., (2017), DOI:10.1002/dev.21560
[3] Veale, J, (2014), DOI: 10.1080/1357650X.2013.783045
[4] Edlin et al., (2015), DOI: 10.1016/j.bandc.2015.01.003

We would like to thank the participants for their time.
For more information about our studies visit **hands.fiu.edu**

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