



Hand Grips as Complementary Instrument in the Determination of Handedness in Males

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Authors' contributions

This work was carried out in collaboration between all authors. Author SPD designed the study, wrote the protocol, and wrote the first draft of the manuscript. Authors SOF and OOA managed the literature searches. Authors IAC, FA and AHB administered the questionnaires of the study and performed the statistical analysis. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JALSI/2015/20627

Editor(s):

(1) Dongpei Li, Department of Neuroscience and Regenerative Medicine, Institute of Molecular Medicine and Genetics, Georgia Regents University, Augusta, GA 30912, USA.

Reviewers:

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(3) Vaibhav Saran, Shiats University, India.

Complete Peer review History: <http://sciencedomain.org/review-history/11814>

Original Research Article

Received 1st August 2015
Accepted 21st September 2015
Published 13th October 2015

ABSTRACT

Aim: To evaluate other complementary uni-manual activities as instrument in the determination of handedness.

Place and Duration of Study: The study area was carried out between April and July, 2014 among male medical undergraduate students of Olabisi Onabanjo University, Remo campus, Ikenne, Ogun state, in the South Western region of Nigeria.

Methodology: A Total of 320 male medical undergraduate students of Olabisi Onabanjo University, Ikenne Campus were recruited for this work. The data for this study was collected using the handedness questionnaires that were administered to the students. The questionnaires were designed to interview the students and constructed in such a way that questions are relevant to the

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research objectives. It contained information pertaining to the hand used for performing certain activities.

Results: Our results showed that 81% of the male students preferred to write with the right, 17% with the left ($P < 0.001$) while 2% have no clear preference. We also found out that in precision, hook and power grip; 75%, 74.07% and 72% preferred the right hand respectively while 16%, 7.63% and 20% preferred the left hand respectively.

Conclusion: We therefore concluded that, handedness can also be defined by other uni-manual activities such as precision, hook and power grips other than a single criterion; the writing hand.

Keywords: Handedness; writing hand; precision grip; hook grip; power grip.

1. INTRODUCTION

Human beings are unique from other species, due to their mental abilities, which have helped them discover the facts of the world and make great progressions in every aspect of scientific achievements. Despite the mental capacity, which is shared by almost all members of the human community, there are many idiosyncratic differences among them, which make every individual a unique person. The organization of brain for different mental processes may be different among people, which is one of the sources that take care of such phenomena. One of such individual differences that have been the focus of many researches is the notion of handedness [1].

Handedness is a deceptively simple phenomenon. Most people use just one hand for writing, usually the right, and if asked their handedness will refer to that hand. In a few cases they might preface their answer by saying that at school they had tried to write with the left hand but had been persuaded or forced to use the right, and are therefore 'naturally left-handed'. And in other cases people will explain that they seem to do some tasks with their right hand and some with their left, making them ambidextrous; in practice, true ambidexterity, if defined as the ability to write equally well with either hand, seems to be almost unknown. The details of handedness, however, are more complex [2].

The study of Gilbert and Wysocki, along with the experimental research of Peters, Reimers, & Manning show that the rate of left-handedness is approximately 13% in males and 11% in females [3]. Noticing that the exact percentage of lefthanders is not agreed upon in the literature, it may suffice to rely on the generalization that approximately ten percent of the population of every culture is left handed in performing tasks such as writing and other uni-manual activities

[4]. This fact highlights the significance of our intent to investigation of such phenomenon and the necessity of conducting further researches in this regard, so that more mysteries about the complexities of the human mind are revealed to the world. Therefore our aim is to evaluate other uni-manual activities that can be used as complementary instrument in the determination of handedness.

2. METHODOLOGY

2.1 Study Area

The study area was Ikenne, a major town in the South Western region of Nigeria, located in Ogun State.

2.2 Study Population

The student population consisted of male undergraduates of Olabisi Onabanjo University, Ikenne Campus. Sample size is 320.

2.3 Sampling Methods

Systematic random sampling technique was used for this study.

2.4 Study Instrument

The data for this study was collected using the Dutch handedness questionnaires that were administered to the students. The questionnaire was designed to interview the students and constructed in such a way that questions are relevant to the research objectives. It contained information pertaining to the hand used for performing certain activities.

2.5 Ethical Consideration

For a successful administration of the research instrument, consent was obtained and strict confidentiality of volunteered information was

maintained by excluding names and address on the questionnaires and explaining the procedure.

2.6 Data Collection

Data collection method used was quantitative and questionnaire was interviewer based. Systematic random sampling technique was used.

2.7 Data Analysis and Presentation

The data were organized in percentages. For clearer analyses and presentations, graphical representations of bar were used.

3. RESULTS

Preference for writing with the right hand was 81% in the male students and 17% with the left ($P < .001$) while 2% have no clear preference Fig. 1.

The hand preference for precision grip showed that 75% of the respondents preferred the right and 16% preferred the left ($P < .001$) while 9% have no clear preference. The hand preferences of the activities evaluated were: Draw; right 81%, left 13% no clear preference 6%. Brush; right 75%, left 12.5% no clear preference 12.5%. Eraser; right 75%, left 17% no clear preference 8%. Match stick; right 69.4%, left 22.2% no clear preference 8.4% (Fig. 2).

The hand preference for hook grip showed that 74.07% of the respondents preferred the right and 18.30% preferred the left ($P < 0.001$) while 7.63% have no clear preference. The hand preferences of the activities evaluated were: Opener; right 69.40%, left 15.30% no clear preference 15.30%. Throw; right 62.50%, left 6.0% no clear preference 31.50%. Spoon; right 90.30%, left 1.60% no clear preference 8.10% (Fig. 3).

The hand preference for power grip showed that 72% of the respondents preferred the right and 20% preferred the left ($P < 0.001$) while 8% have no clear preference. The hand preferences of the activities evaluated were: Hammer; right 79%, left 18% no clear preference 3%. Racket; right 69%, left 25% no clear preference 6%. Knife; right 68%, left 16.7% no clear preference 15.3%.

4. DISCUSSION

In most of the studies the hand used by individuals in writing has been used as the most

reliable index of handedness. However, there is an argument against such a single-criterion approach since writing is a learned behaviour on which, teaching the skill can have an influential effect [5]. In the present research, however, hand grips were chosen as indicators of handedness among individuals. Our results showed that 81% of the male students preferred to write with the right than the 17% the left ($P < .001$) while 2% have no clear preference Fig. 1. In this study we evaluated dimensionality, direction, degree and skill of handedness as reported in Figs. 2-4. The handedness questionnaires took note of the skill and dexterity as exhibited by the three types of hand grips; the multiple dimensional components of handedness as indicated by the multiple activities evaluated, we also distinguished between direction and degree of handedness. Direction refers to whether it is the right or left hand that is dominant, and degree refers to the extent of that dominance. Our research found out that in precision, hook and power grip; 75%, 74.07% and 72% preferred the right hand respectively while 16%, 7.63% and 20% preferred the left hand respectively Figs. 2, 3 and 4. Others have no clear preference; 9% in precision grip, 18.30% in hook grip and 8% in power grip. The preference for writing hand is just 6-9% above the percentages of other unimanual activities evaluated; thereby supporting the notion that writing hand should not be used as a single indicator for cerebral lateralization. It is obvious to all that the human hand (hand grip) represents a mechanism of the most intricate fashioning and one of great complexity and utility. But beyond this it is intimately correlated with the brain, both in the evolution of the species and in the development of the individual. Hence, to a degree we "think" and "feel" with our hands, and, in turn, our hands contribute to the mental processes of thought and feeling. Hence hand grips are not only manual activities but could be used as instrument in the determination of handedness and brain lateralization.

In an attempt to provide answers for the question that "what accounts for the individual differences among people in terms of their handedness, two sets of explanations were put forward (1): Non-genetic explanations take into account the environmental factors and the cultural transmission of handedness between generations [1]. Many of the recent studies also support such an approach in determining the influential factors on hand preference among individuals. The low percentage of the left handedness in this study is in tandem with

previous studies by Bosman [4], Klar [5] and Vuoksima et al. [6] that concluded that most of the variance in handedness is explained by environmental effects, while there are also some familial, probably genetic effects that are not detectable in smaller samples. The second theoretical basis offered by Bishop supports the idea that all human beings have a genetic bias to

be right-handed [7]. Some theoretical explanations suggest a sort of genetic basis for handedness and its inheritance. McManus, for example, contend that a single gene controls both handedness and language lateralization. Some quantitative evidences also have been emerging recently that prove the inheritance of handedness from parents to offspring [8].

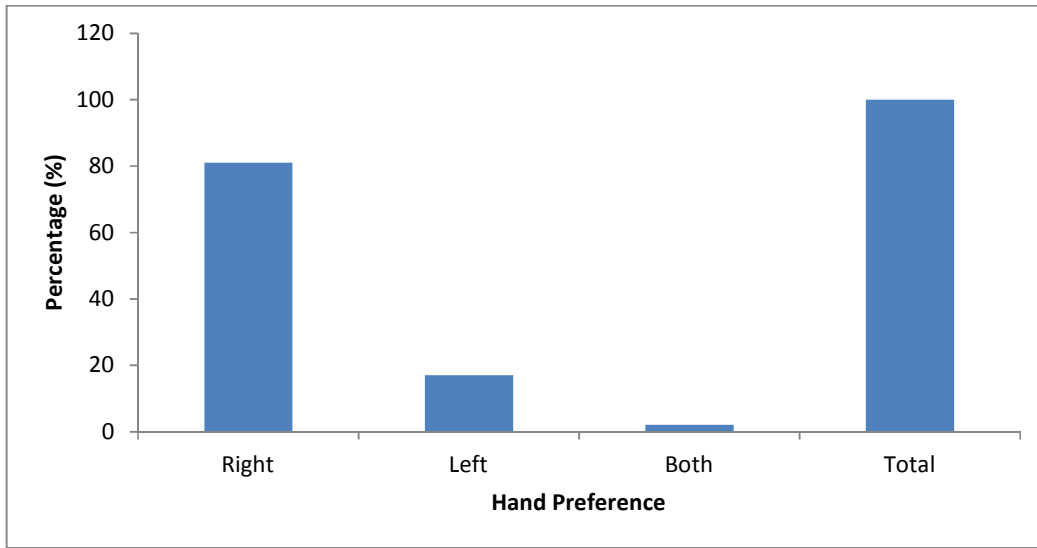


Fig. 1. Percentage hand preference among male students

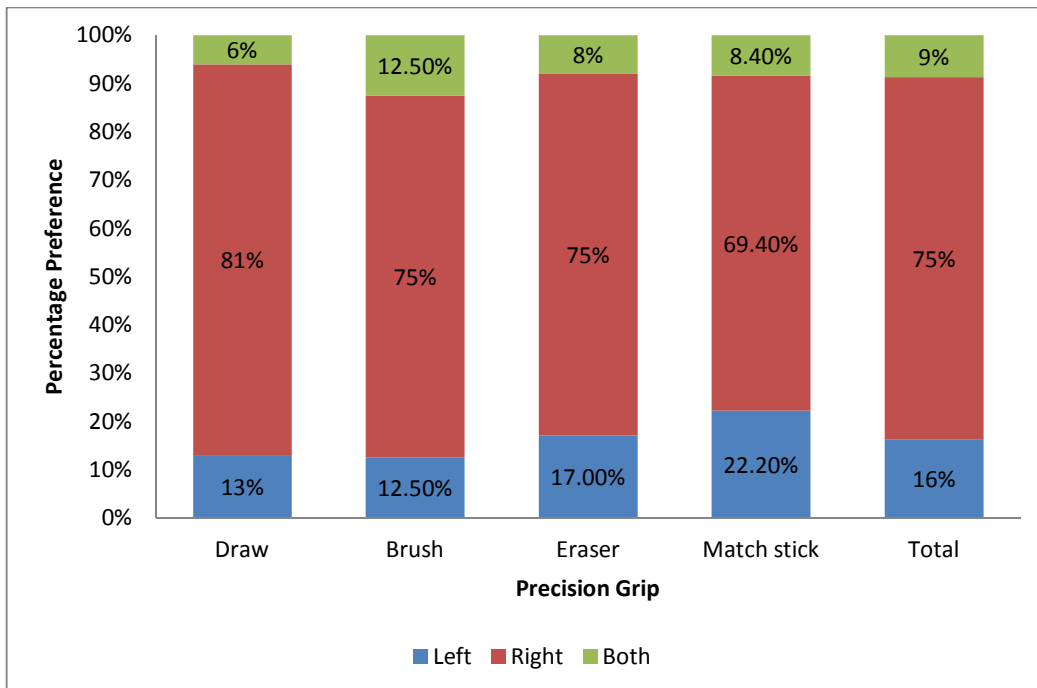


Fig. 2. Hand preference in precision grip

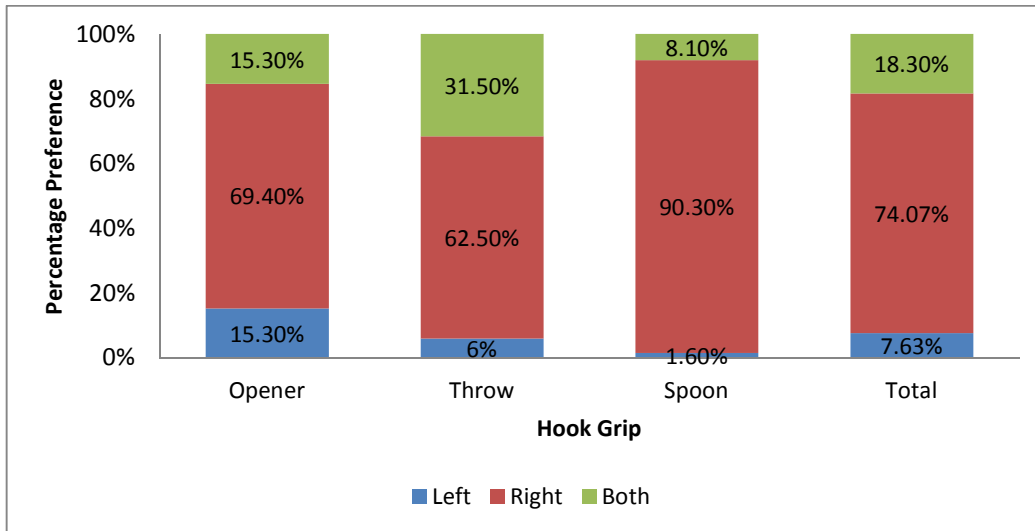


Fig. 3. Hand preference in hook grip

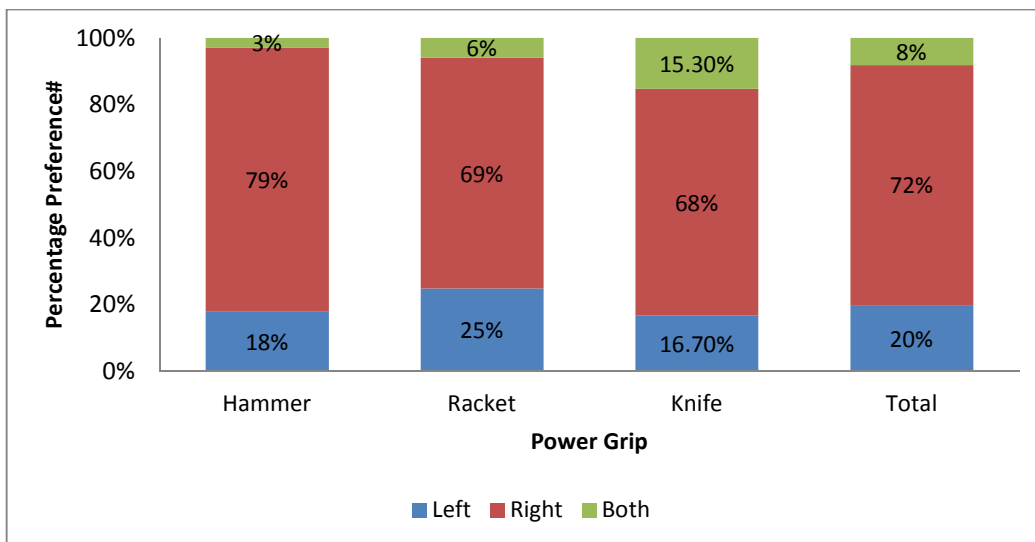


Fig. 4. Hand preference in power grip

In the present research, however, hand grips were chosen as indicators of handedness among individuals rather than a single- criterion approach since writing is a learned behaviour on which, teaching the skill can have an influential effect. Our results although limited by scope, gender and genetic factor: parental handedness, have now doubt provided some strong correlation between handedness and hand grips. And the ever-important functions of manual praxis and communication via language not only exhibit strong asymmetries, but shows intriguing paradigm of the efficiency and adeptness of the human brain.

5. CONCLUSION

We therefore concluded that, handedness can also be defined by other uni-manual activities such as precision, hook and power grips other than a single criterion; the writing hand.

CONSENT

The aim, methodology and the protocols of the study were explained to the students volunteers and their consent gotten before administering the questionnaires.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:

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