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## 大脳半球による手の使用の左右差と社会的抑制の研究

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# Side-bias in Hand Preferences and Social Constraints among Students

## 大脳半球による手の使用の左右差と社会的抑制の研究

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### Abstract

Children with several disabilities and 1<sup>st</sup> to 4<sup>th</sup> year university students in Japan were examined on Handedness responses for unilateral activities using a manual task sampling procedure on one time. Side-bias self-rating list was constructed and utilized to record the chosen activities for hand side preferences in which they experienced the social pressures to change the side as desired by surrounding people for performing certain daily activities. 16% students exhibited strong social constraints and pressures in hand preferences and were mainly reported in writing activities using pencil or ball pen and using chopsticks, and shaking hand was not found as a strong predictor of social stigma for hand preference etc. out of the tested eleven social constraint situations in Japanese setup.

### Introduction

It is many times an attention drawing matter that which hand a specific person is using. For example, ex-president of USA, Mr. Obama was using left hand for shaking hand and signatures. Neurologists says these side preferences are decided by brain semi-hemispheres, but many times these are observed as behavioral or social oriented. Side bias are seen in long limbs (handedness, footedness) and sensory organs (eyedness, earedness). Mostly hand preferences are seen as a social stigma in Asian and European countries, while the leg, eye and ear preferences do not become such issues interestingly. The use of side preferences was found different in the children with developmental disorders (Bishop, 1990; Kumar et. al, 2010). Though some social prepositions

are there to point out to the phenomenon which seems to be invariant to cultural predisposition. In a recent study, it has been found that there is a clear interrelatedness between the long limbs (hand, foot) with the cerebral lateralization pattern (Kumar et al., 2012), pointing out to a common biological mechanism for side bias including eyedness and earedness. Sometimes parents or teachers impose social sanctions such as impose of tangible costs of money, time and economic loss, and leading for fine, incarceration, and some kinds of fines. Parents consider children's hand preferences wrong or social ill manners and had to be corrected in the direction of socially desired hand preferences. Some social sanctions may influences the hand side bias preferences and some may not. Parents usually point out or emphasis to use the socially desired hand preferences from infant to elementary school age and maximum up to high school level. for certain daily tasks such as for writing, or using chopsticks, knife and fork, throwing a ball, shake hand, handing a needle for sewing etc., and many times exhibit a strong pressure to make use of the right hand as found in many Asian countries. The incidence of left-handedness has been found to be as low as four to six percent in traditional societies like Asia and Africa (for example, India 6.8%: Mandal, Pandey, Singh, & Asthana, 1992; Japan 4.7%: Ida, Dutta, & Mandal, 2001), while in modern societies like the United States, Canada, and England it averages at 15-20% (Perelle & Ehrman, 1994; Suar, Misra, Mandal, & Suman, 2008). But in our previous studies the left-handedness was found more than 7% among Japanese students (Kumar, Kim, Oh, 2018a&b). Side influence on foot is relatively less; and hardly observed to be pointed out in eye and ear side use (Kumar, Kim, Oh, 2017; 2018a&b). The normal process of side bias involves asymmetrical use of paired organs (like hand, foot, eye, and ear) for most behavioral functions. By side bias we mean preferential use of one side of the body as a function of preference or performance (Bryden, 1982; Mandal, Bulman-Fleming, & Tiwari, 2000). The incidence of atypical or clumsy handedness in population is reported mostly in children with certain forms of developmental disorder. The Geschwind-Behan-Galaburda (Geschwind, & Behan, 1982; Geschwind & Galaburda, 1986) model suggests that high level of testosterone during embryonic development affects maturation of brain development, especially the left hemisphere resulting in anomalous handedness. The model is tested in some studies but with contradictory findings. While some studies showed atypical or anomalous handedness, others did not observe so.

Side bias is considered important for the purpose of resource allocation and effective motoric-coping with the environment. The asymmetrical use of paired organs is primarily controlled by the two sides of the human brain. Since the left hemisphere is dominant for most individuals (about 90%), the contralateral side of the body (the right hand, the right foot) is more preferred for motor functions. The right hemisphere controls the left side of the body, and the left hemisphere controls the right side. In most people, the left hemisphere regulates language and speech, and the right hemisphere controls nonverbal, spatial skills. If the right side of the brain is damaged,

movement of the left arm and leg, vision on the left, and/or hearing in the left ear may be affected. Injury to the left side of the brain affects speech and movement on the right side of the body. It seems that each and every matter of our daily living related to hand, leg, eye, and ear use are somehow influenced by social pressures, but it may be more for hand related activities and lesser in others.

At discussion of above issues, we examined social constraints, sanctions, or pressures that influenced hand preference situations referred to hand change as experienced by university students and children with disabilities in Japan using a Self-rating Social Pressures Identification Check-list for hand preferences.

## Method

### *Sample*

Children with disabilities ( $N = 5$ , Mean age 17.2yr.) and undergraduate university female students ( $N = 103$ , Mean age 19.8yr.) in Japan were considered for the study. The subjects were right-handers (R) and may be they were left-handers (L) in young age or *vice-versa*. The students did not have any apparent motor or mental difficulty that may hinder their daily functioning or any kind of disability or disease in hand. A brief introduction of the study was given to the students and informed consents were taken prior to administer the study check-list. They were asked to rate the items as per their own recognitions and feelings as they experienced social pressures in their day to day life activities of hand preferences or for hand change.

### *Tools & Procedure*

Japanese version of the Self Rating Social Pressures Identification Check-list for Hand Preferences (SSPICH) (*attached*) were administered among the students. There were total 11 situational items in the check-list to be answered as “Yes” or “No” and a demographic data to mark the present use of hand preference, at what age they changed the hand use, and the social pressures they experienced for hand change were as strongly pointed out by parents, such as looked at them strangely or with anger or in an ill-mannered way when using socially un-expected hand. Free writing space was also there in end of the check-list if there is any other kinds of social sanction or pressure they felt or perceived related to hand use. Laterality quotient was not studied as a research question.

The Check-list items for hand preference activities the subjects experienced for change of hand preferences pointed out by others or looked at hard in the situations as (1) When shaking hand, (2) When writing by pen or pencil, (3) When picking something by hand, (4) When giving

things to others by hand, (5) When using chopsticks, (6) When throwing a ball to hit target, (7) When holding a bag in hand, (8) When holding a mic, (9) When a wrist watch putted on at right hand (10) When a finger ring putted on at other fingers, (11) When drinking something, and (Others) to write the experienced hand change activities other than above eleven items for free writing. Check-list items were self-rated by the participants and third person observers were not included.

## Results

Out of 108 participants, 14 right-handers and 3 left-handers ( $n = 17$ , 15.74%) subjects reported the social pressure experiences for hand change and age on the check-list. The hand change was found most up to age of 2 yrs. ( $n = 4$ , 3.7%) and then up to age 4, 5 years and two reported before 16yrs. It can be said that the hand preference is changed by social sanctions most by the age of 2 years and maximum up to 16 years and that pressure could work in 16 percent of subjects.

The items on which the subjects mostly experienced the social sanctions was when using "pen or pencils". None was noticed on "mic use". Present right and left handers reported the social pressures on the situation items (1) shake hand (R = 3, 2.8%, L = 1, .93%, total = 3.7%), (2) pen pencil use (R = 14, 12.96%, L = 1, .93%, total = 13.89%), (3) something picking by hand (R = 6, 5.56%, L = 1, .93%, total = 6.48%), (4) giving something by hand (R = 5, 4.63%, L = 1, .93%, total = 5.56%), (5) chopstick use (R = 12, 11.11%, L = 3, 2.78%, total = 13.89%), (6) throwing a ball (R = 6, 5.56%, L = 1, .93%, total = 6.48%), (7) holding a bag in hand (R = 4, 3.7%, L = 0, 0%, total = 3.7%), (8) holding a mic (R = 0, 0%, L = 0, .0%, total = 0%), (9) putting on a wrist watch (R = 4, 3.7%, L = 1, .93%, total = 4.63%), (10) putting on a ring finger (R = 2, 1.85%, L = 0, .0%, total = 1.85%), and (11) holding a drink in hand (R = 1, .93%, L = 0, .0%, total = .93%). In free writing column as others, (R = when joining the hands in play, making a victory pose when taking a together picture, L = when holding a needle for sewing).

## Discussion & Conclusions

The study revealed that 16% students were experienced strong social pressures or sanctions for the socially unexpected hand preference. Though it was estimated that most of the left-handers might have experienced strong social forces for hand changes and those were just 3-4%. It may be a chance that the present right-handers might be the left-handers earlier and now have shifted to right-handers. But in aggregate, only sixteen percent of Japanese population experienced social constraints for undesired hand preferences.

Regarding the situations they were strongly pressed for hand change activities were not more than 15 social activities of hand use. Usually, in Asian culture, right hand is expected to be the desired social preference in the activities mainly when interacting with people using our hand preference activities such as shaking hand, giving-taking-picking things, eating habits in front of others, writing habits, wearing accessories, throwing activities, and tool using activities.

In Japanese culture, most social pressures were experienced by the participants were in (i) Writing activities using Pen or Pencil and Chopstick use activities by left hand, followed by (ii) Picking things by hand or throwing a ball activities by left hand, (iii) Giving things using left hand activities, (iv) Wearing a watch in right hand, (v) Shake hand by left hand or Holding a Bag in left hand, and (vi) very fever pressure for wearing a Ring in a undesired finger or using left hand for Drinking. The Mic use activities were not pointed et al. A left-hander students also mentioned that she was socially pressed to use right hand to hold a needle for sewing, victory pose when taking a picture, and in hands' joining play activities to match with others. There was not a clear hand preference change trend in the children of disabilities except a small change reported by the parents of a child with autistic spectrum disorder. Therefore, it reflected from the study that in Japanese culture, 16 percent people had changes in hand preferences by social pressures or sanctions up to the age of 2 years or maximum until the age of 16 years. Previously those who were left handers and now are right handers, experienced strong social sanctions, constraints or pressures in writing and eating habits at the use left hand. Writing and eating habits should be done by right hand and was found a strong social stigma. Interestingly, the shake hand was not found as a strong social predictor for hand change pressures in Japan. It may be due the Japanese culture which do not have a shaking hand culture for greetings. This study is also in the finding direction of Charles and Wysocki (1992) that writing and throwing activities were mostly pointed out by surroundings. Therefore, writing and eating habits are the strong predictors of social pressures for social side bias activities in hand preference in Japan. Although, the shake hand by left hand was not so much pressed. It was supposed that the left or right handers may face unlimited social barriers when interacting with people in society. In reverse, the study investigated that in Japanese culture, strong social stigmas for hand preferences were not more than 5 types out of 10 types hand preference selected situations. Writing or eating by chopsticks were only forced to be performed by right hand. Rest of the hand preference activities are not the matter of attention for hand preference correction and the subjects did not feel any problem in day to day life being a social stigma. In our next study, we will try to find out the hand preference change by social pressures in the children with disabilities and to compare the social constraints or pressures situations in other cultures.

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### Self-rating Social Pressures Identification Check-list for Hand Preferences (SSPICH)

-現在の利き手： 右 ・ 左

-今までに右や左の手の使い方を変えたことがありますか。YES NO (何歳のとき： )

-手の使い方は他人に変えるように指摘されたか、他人からの不快な視線を受けたか？

以下の項目にお答えください。

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1. 握手をするとき	YES	NO
2. 鉛筆やボールペンで書くとき	YES	NO
3. 手で食べ物を取るとき	YES	NO
4. 物を人に渡すとき	YES	NO
5. 箸を使うとき	YES	NO
6. ボールを投げるとき	YES	NO
7. カバンを持つとき	YES	NO
8. マイクを持つとき	YES	NO
9. 腕時計をしているとき	YES	NO
10. 指輪をつけているとき	YES	NO
11. 飲み物を飲むとき	YES	NO

それ以外にある場合は記入してください。

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