Left-right discrimination strategy

and the influence of hand visibility and congruency

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Abstract

To orientate ourselves in daily life, knowing the difference between left and right is crucial. Yet, many healthy humans experience difficulty while making left-right (LR) decisions in daily life. Assumed is that a hand strategy decreases left-right confusion (LRC). By using the Bergen Left Right Discrimination Test four conditions were tested to examine whether visibility and congruency of the hands were of influence on making LR judgments. A higher LRC in the invisible-incongruent condition compared to the visible-congruent conditions was expected. No significant differences were found, showing that the visibility and congruency of the hands are of no influence on LRC. Second, questions were included in the study focused on gender, handedness and dyscalculia. For gender only a significant difference was found on self-report. No difference was found for handedness. A significant difference was reported for LRC and dyscalculia; a higher RT on the LR discrimination test shows a score below cut off on a numeracy test.

Keywords: left-right confusion, gender differences, handedness, hand visibility, hand congruency

1. Introduction

Knowing the difference between right and left, up and down, and far and near is important for orientating ourselves with other objects in the environment, which is crucial for us to operate in daily life. Compared to up/down and far/near, knowing right from left develops with experience and relatively late in human development (Gold, Adair, Jacobs & Heilman, 1995; Jordan, Wüstenberg, Jaspers-Feyer, Fellbrich & Peters, 2006). An adult level of left-right (LR) orientation is normally achieved at age 12. However, inter-individual differences in adults still occur when it comes to LR discrimination (Hirnstein, Ocklenburg, Schneider & Hausmann, 2009). Left-right confusion (LRC) is part of the Gerstmann's Syndrome (Gold et al., 1995; Manga & Ballesteros, 1987), but also, there is evidence that 42% of the healthy adults experience difficulty in LR discrimination while performing daily activities (McMonnies, 1996). Results derived both through self-report and objective measures (Hannay, Ciaccia, Kerr & Barrett, 1990; Hirnstein, 2011; Manga & Ballesteros, 1987; Ocklenburg, Hirnstein, Ohman, & Hausman, 2011; Ofte, 2002).

In literature, only a limited number of studies have been focused on LRC, mostly on gender, handedness, and education. These studies provide potential explanations of the inter-individual differences on LR discrimination. Why does person A experience LRC and person B does not? A few results of previous studies will now be described.

The studies that include gender as a factor indicate there is a gender difference; females believe themselves to have greater LRC than males (Hannay et al., 1990; Jordan et al., 2006; Ocklenburg et al., 2011). Since results are derived from self-report studies, an explanation could be that females are more prone to rate themselves less skilled in making LR decisions than males (Jordan et al., 2006). But also in objective measures females perform worse in LR decisions. An explanation given by Hirnstein and colleagues (2009) is the mental rotation that is involved in LR decisions. There is evidence that males outperform females in mental rotation tasks (Linn & Petersen, 1985), though another study found evidence that LRC does not involve mental rotation (Ocklenburg et al., 2011). Second, there is evidence that LRC is linked particularly on the left hemisphere (Hirnstein et al., 2009) and the greater communication of both hemispheres in the females brain, compared to the male brain (greater lateralization of the males brain), could be an explanation for a greater LRC in females (Manga & Ballesteros, 1987; Hirnstein et al., 2009).

To explain inter-individual differences studies on LRC and handedness have been done. No significant difference has been found (Jaspers-Fayer & Peters, 2005; Ofte, 2002). Another inter-individual difference could be educational background. A study on LRC and educational background shows us that medical students perform better on LR discrimination tests compared to law and psychology students. A given explanation is medical students are more experienced in visuospatial concepts and tests, which also includes mental rotation. This may have facilitated in the student's strategy on the LR discrimination test (Ofte, 2002).

As suggested by the educational background study of Ofte (2002), the more sophisticated a strategy, the more LRC will decrease. Therefore, strategy might be an important factor in LR discrimination, which could perhaps effects other factors like gender, though no study is found on the influence of different strategies.

If a person's strategy is of influence on the LR performance, focusing on what strategy is of use in LR discrimination is important. A well-known strategy for LR discrimination is holding the index finger and thumb in an angle of 90 degrees. On your left hand the two fingers compose an "L", on your right an inverted "L". Another strategy could be jewelry on a certain hand (e.g. wedding ring on your right hand). The 'left-hand-L' and 'ring-on-right' are visual hand strategies.

Next to visible strategies, also non-visible strategies might be used. A non-visible strategy might be imagining on which side of the road you drive (e.g. the Dutch drive on the right side of the road). The non-visible strategy could involve motor imagery. Motor imagery is a dynamic state in which a subject mentally simulates a given action (Decety, 1996). Also when a person is unable to use or look at his/her hands while using the "left-hand-L" strategy for LR judgments, motor imagery might be used. The person imagines a given action (imagining holding fingers in a 90 degree angle).

Little is known about the contribution of strategy to the level of LRC, yet it could be an influential factor. Therefore, this study will focus on examining whether a strategy has an influence on correct LR judgments and the reaction time of the discrimination. A distinction will be made between visible and non-visible strategies. Prior to this study a LR strategy question was given out to 104 participants (21 males; 83 females). The question, "how do you discriminate right from left", had to be answered by picking one of the given multiple answers, resulting in 21 percent of the participants picking the "left-hand-L" and 37.5 percent "knowing your writing hand" as their most used strategy while making LR judgments. Thirty-seven and a half percent indicated not using a strategy at all, 4% uses "driving side of the road" as their strategy. Based on these results, a hand strategy (58.5%) is the main strategy used for LR discrimination. Therefore, the main question of this study is whether visibility of the hands influences a person's ability to make LR judgments. According to the previous test, one would expect that LRC is greater while the hands are invisible, compared to visible hands. Also, congruency of the location of the hands will be examined in the visible and invisible condition. The same assumption applies while the hands are in an incongruent state; visible-congruent hands will lead to lower LRC than invisible-incongruent hands. A congruent visual state of the hands is assumed to facilitate LR judgments the most.

Most of the previous studies done on LRC include gender and handedness. Because the number of studies reported is still small and results are inconclusive, gender and handedness will also be considered in this study. A gender-based difference in LRC is expected; females experiencing a higher LRC than males on self-report as well as on the experimental test. No significant correlation between handedness and LRC is predicted.

As described earlier, LRC is part of the Gerstmann syndrome. Another element included in the Gerstmann syndrome is dyscalculia. Evidence has been reported that subjects with dyscalculia also experience a decreased ability in LR discrimination (Spellacy & Peter, 1978). Little literature is found on the relation between LRC and dyscalculia, but since LRC occurs in the Gerstmann syndrome as well as in healthy adults, this could be the same for dyscalculia. As a secondary question, this study will look at the possible relation between LRC and numeracy, to examine a possible relation between LRC and dyscalculia.

2. Methods

2.1. Participants

Eighty healthy males (*N*=28) and females (*N*=52) participated in this study. The mean age was 24.18 years (*SD*=3.13) for males and 23.46 years (*SD*=2.85) for females. Seventy-three were right handed (26 males and 47 females) and 7 left handed (2 males and 5 females), as determined by the Edinburgh Handedness Inventory (EHI; Oldfield, 1971), using a cut-off score of 20. Participants below cut-off score were placed into the left handed group, above cut-off score into the right handed group. Ratings will be explained under *Edinburgh Handedness Questionnaire*. Educational level ranged from higher general secondary education through university educational level. Participation was voluntary. The experiment was conducted according to the Declaration of Helsinki. Informed consent was provided by all participants.

2.2. Procedure

The experiment took place in an examination room. By using a dark and quiet room for all participants, we were able to control the setting and exclude the influence of environmental factors. Each test session began with an informed consent and general questionnaire (gender, age, education) followed by a digitalized version of the Bergen Left-Right Discrimination Test (Ofte, 2002). Subsequently, they completed the Arithmetic Test (Kal, unpublished thesis), the EHI (Oldfield, 1971), the left-right self-rating questionnaire (Hannay et al., 1990), the left-right strategy questionnaire and part two of the general questionnaire (including questions for dyscalculia, family members with LRC, used strategy during study, study experience). Prior to the experiment the participant was not informed about the aim of the experiment. If desired the participant was informed at the end of the experiment. Except for the general questionnaire, which was presented on paper, all tests and questionnaires were presented in OpenSesame.

2.2.1 Bergen Left-Right Discrimination Test

A digitized version of the originally paper and pencil version of Benton's Left-Right Discrimination Test was used. This is a, partial mental rotation test, which involves making left-right decisions. The test consists of line drawings of a figure of 11 cm high, viewed from the back (black head) and front (white head). The shoulders were represented as a black triangle; circles at the end of the arm indicate the hands of the figure. During the test the participant saw the figure viewed from the front (white head) or the back (black head) with three different arm conditions (no arm crosses, one arm crossed, two arms crossed). One hand of the figure was colored red, this could have been either the right or left hand (see Fig. 1).

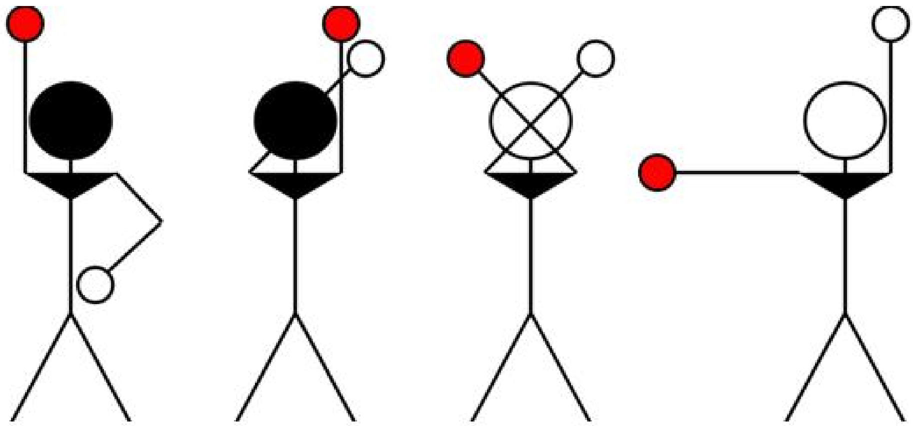

Figure 1. *An example of the line figures from the back (black head) and front (white head). Viewed with one hand crossed, two hands crosses and no hands crossed. Alternately the left or right hand is colored red.*

The test has two factors; visibility and congruency. Both factors relate the hands of the participant. The hands of the participant were in front of the participant on the table, between the body of the participant and the computer screen, at shoulder width. The congruency factor contained two conditions; congruent and incongruent. In the congruent condition, the hands of the participant were next to each other on the table; the left hand on the left side, the right hand on the right side, with a distance of 23 cm. between the forefingers. In the incongruent condition, the hands of the participant were crossed on the table; the left hand on the right side, the right hand on the left side, with a distance of 23 cm. between the ring fingers. Also the visibility factor contained two conditions; visible and invisible. The difference between the visible and invisible condition was a box and black cloth that covered the hands during the invisible condition. During the test, participants were asked to hold her/his hands still. The factors visibility and congruency were combined resulting in four conditions (a. congruent and visible – b. congruent and invisible – c. incongruent and visible – d. incongruent and invisible). To prevent a learning effect, the conditions were pseudorandomized, which resulted in eight different tests sequences (abcd – cdab – badc – dcba – acbd – bdac – cadb – dbca).

Each participant was tested for each condition. Each condition got the same test that contained 60 trials. These 60 trials were divided into 15 front-left arm figures, 15 front-right arm figures, 15 back-left arm figures and 15 back-right arm figures. The test started with a practice-trial of 20 trials (3 front-left, 3 front-right, 3 back-left, 3 back-right, 8 mixed), followed by the test which contains 60 mixed trials. The test was repeated 3 times, thus all four conditions were tested. The first practice trial presented 20 practice trials. The next three practice trials presented 5 mixed trials. The total test contained 35 practice trials and 240 mixed test trials.

The instructor started the test by a mouse click (left button). Each trial started with a fixation cross (+) in the center of the screen. After 1000 ms a picture of the line figure was shown. The participant was asked to give a vocal response, as quickly as possible, as to whether the red colored hand of the figure was the left or the right hand. This response was done by saying RIGHT or LEFT into the microphone, which stood in front of the participant (at a distance of 12 cm on the table) and was connected to the computer. The reaction time of the participants' vocal response was registered by the microphone. After the verbal response into the microphone the next trial was exposed, starting with the fixation cross. To register the correct LR responses, the given response was marked on a form by the investigator, who was sitting behind the participant. The test was presented on a computer screen standing at 34 cm distance from the participant. Background color of the computer screen was white. Instructions, fixation crosses and line figures were black. Microphone was within 10 cm of each participant's mouth. The participant was instructed to only give a LR response. A response of, for example, "uuuh" was reported as an incorrect influence on the reaction time. The instructor recorded these false responses and the RT of this trial was excluded from the data.

2.2.2. Arithmetic Test

To test numeracy the Arithmetic Test developed by Kal (unpublished thesis) was used. Originally the test contains two arithmetic operations (subtraction/multiplication) and two levels of difficulty (lower level/higher level). This study only used subtraction at lower level. The test consisted of 5 practice sums and 20 test sums. The test started with an instruction. When everything was clear and understood, the practice trial was started. The instructor started the test by a mouse click (left button). Each trial started with a fixation cross (+) in the center of the screen. All participants were instructed to solve the sum as quickly as possible and to hit the SPACEBAR once they had solved the sum. The time allowed to solve the sum was infinite. After the SPACEBAR was hit, the sum disappeared from the screen and a white background appeared. The participant was asked to enter the answer on a keyboard. The next trial was presented after the participant had hit the ENTER button. The input screen was locked 2000 ms. after the SPACEBAR was hit, even when the answer had not (yet) been typed in. The fixation cross was presented again and everything was repeated until all trials were finished. The lower-level subtraction consisted of two-digit (ranged from 27-95) minus one-digit (ranged from 2-7) numbers. Both accuracy and reaction time was logged.

2.2.3. Edinburgh Handedness Questionnaire

A handedness scale of 10-questionnaire items used was adopted from Oldfield (1971). Ten daily activity questions (e.a. "With which hand do you use a toothbrush"?) were answered on a 3-point scale ("left", "either" or "right"). The three options were rated with 1, 2 or three points, respectively. Participants with the score 10-20 were rated left handed, a score between 20-30 was rated right-handed, a score of 20 was rated both handed.

2.2.4. Self-Rating Questionnaire

A questionnaire that contains four questions that deal with LR judgments (e.a. "As an adult, I have noted difficulty when I quickly have to identify right versus left") was adopted from Hannay et al. (1990). Participants answered all questions on a five-point scale, where "1'" indicated no problems at all and "5" indicated constant problems, resulting in individual scores between 4-20 for LRC.

2.2.5. Left-Right Strategy Question

A left-right strategy question was developed to examine what strategy the participant used while making left-right decisions in daily life (see Appendix 1). The participants were asked how they discriminate left from right. Multiple answers were given, the participants were asked to cross the one that they thought fit them best.

2.3. Analyses

The main question of this study examined whether visibility and congruency of the hands has an influence on a person's ability to make left/right judgments. Independent variables were visibility and congruency, a within subject 2X2 design (visible/invisible and congruent/incongruent). To measure the relation between these four conditions and LRC, a *repeated-measures ANOVA* was used. Expected was a main effect for both variables; visibility and congruence would show both higher accuracy and RT than invisibility and incongruence, respectively.

Examining whether gender and handedness have a significant correlation with LRC, the results of the visible-congruency condition were used, considered as a baseline measure. By performing an *independent t-test*, a significant difference for gender and LRC was expected both for the objective measure as self-report; females showing higher LRC than males. The *Mann-Whitney U Test* was used to examine the difference between left- and right-handed participants on making LR judgments. No significant difference was expected to be found in handedness and LRC.

Analyzing the response time and accuracy on the Arithmetic Test, standardized norms were used. Norms were split out for education, gender and age. Using these norms, participants were placed into two groups; above and below cut off score. Also here, the visible-congruent condition was used as a baseline measure. By performing an *independent t-test* a significant difference was expected, above cut off score performing better than below cut off score on the LR discrimination test.

In the general questionnaire participants were asked if they were diagnosed with dyscalculia. A *Mann-Whitney U Test* was performed to test a possible effect.

3. Results

3.1 Visibility and congruency of the hands

For all four conditions accuracy and reaction time was measured. No significant main and interaction effects were found for visibility and congruency, both on accuracy and RT ($F < 1$). Descriptive statistics of the four conditions are shown in table 1.

Table 1. *Accuracy (Acc) and Reaction Time (RT) Results for the Four Conditions.*

	Acc (%)		RT (ms)	
	M	SD	M	SD
Visible-Congruent	93.34	7.19	1251.49	331.81
Visible-Incongruent	93.27	7.7	1251.43	361.5
Invisible-Congruent	93.58	8.43	1242.69	347.57
Invisible-Incongruent	92.48	8.32	1240.36	364.92

A selection was made for participants using a hand strategy while making LR judgments in daily life, determined by the *Left-Right Strategy Question*. No significant effects were found for accuracy and RT ($F < 1$). Also, no significant difference was found between the two groups (using a hand strategy/not using a hand strategy) on all four conditions. Descriptive statistics of the four conditions after the selection are shown in table 2.

Table 2. *Accuracy (Acc) and Reaction Time (RT) Results for the Four Conditions after the Selection for Hand Strategy.*

	Acc (%)			RT (ms.)		
	N	M	SD	N	M	SD
Visible-Congruent	36	92.59	8.08	38	1323.00	389.08
Visible-Incongruent	36	92.28	8.63	38	1312.96	458.23
Invisible-Congruent	36	93.55	747	38	1294.48	412.88
Invisible-Incongruent	36	91.99	8.96	38	1285.51	44626

3.2 Gender

There was no statistically significant difference for gender on the objective measure for accuracy, *t*(76) = 0.488, ns., and RT, *t*(78) = -1.893, ns.. A significant effect was found for gender on self-report, *t*(77,71) = -5.020, $p < .001$, indicating males outperform females on making LR judgments. The results are shown in table 3.

Table 3. *Accuracy(Acc) and Reaction Time(RT) Results of the Visible-Congruent state for Males and Females. And Results of the Self-Rating Questionnaire for Males and Females (score between 4-20, whereas 4 means no LRC at all and 20 means constant problems).*

	Gender	N	M	SD	t	df	Sig. (two-tailed)
Acc (%) Visible-Congruent	Male	28	93.88	7.15	0.488	76	.627
	Female	50	93.05	7.26			
RT (ms) Visible-Congruent	Male	28	1157.34	269.90	-1.893	78	.062
	Female	52	1302.19	352.84			
Self-Rating (score 4-20)	Male	28	5.75	1.84	-5.020	77,71	<.001*
	Female	52	8.60	3.23			

**Significant*

3.3 Handedness

There was no statistically significant difference between left- and right handed participants on LRC, U = 228.000, $N1$ = 7, $N2$ = 73, ns.. This confirms the hypothesis.

3.4. Numeracy

Using the standardized norms of the *Digital Arithmetic Test* (Kal, unpublished masterthesis) participants were placed into two groups, above and below cut off score. For RT a significant effect was found, $t(78) = -2.352$, $p < .05$. Results are shown in table 4.

Table 4. *Results for the Numeracy Test.*

	Score numeracy test	N	Mean	SD	t	df	Sig. (two-tailed)
Acc (%) Visible-Congruent	>cut off score	70	93.45	7.39	0.398	76	.692
	<cut off score	8	92.38	5.39			
RT (ms) Visible-Congruent	>cut off score	61	1204.13	265.45	-2.352	78	<.05*
	<cut off score	19	1403.55	465.12			

*Significant

Participants were also asked if they were diagnosed with dyscalculia. No significant effect was found for accuracy and RT, U = 24.000, $N1$ = 1, $N2$ = 79, ns..

Discussion

The main question of the current study was whether visibility and congruency of the hands is of influence on a person's ability to make LR judgments. The two factors visibility and congruency both concerned the hands of the participant, which were in front of the participant on the table. The visibility factor contained two conditions; visible and invisible. The difference between the visible and invisible condition was a box and black cloth that covered the hands during the invisible condition. Also the congruency factor contained two conditions; congruent and incongruent. In the congruent condition, the hands of the participant were next to each other on the table; the left hand on the left side, the right hand on the right side. In the incongruent condition the hands of the participant were crossed on the table; the left hand on the right side, the right hand on the left side. The *Bergen Left-Right Discrimination Test* was used to examine a person's LRC on all four conditions. Expected was a greater LRC while the hands were in the invisible-incongruent state, and a visual-congruent state of the hands was assumed to facilitate LR judgments the most.

Both on accuracy and RT no differences were found between the four conditions. This rejects the hypothesis by implying that visibility and congruency of the hands does not influence one's performance on making LR judgments. At the end of the experiment participants were asked to describe their strategy and how they experienced the test. Some participants reported the invisible state provided more focus on the test, because the arms and hands were covered which provided less distraction during the test. This could explain why an increased outcome on LRC in the invisible state was not found.

This study focused on the hands of the participants, as it was assumed that a person uses as a hand strategy while making LR decisions in daily life. This assumption was made on the outcome of the *Left-Right Strategy Question*, which was given out prior to this study. The same question was given to participants who were included in this study. An analysis was performed for only the participants who claimed to use a hand strategy while performing LR judgments in daily life. The same results were found as before the selection; both for accuracy and RT no differences were found between the four conditions. The *Left-Right Strategy Question* was a question with respect to LR decisions made while performing daily activities. The results of the *Bergen Left Right Discrimination Test* were derived in a test condition where participants were only focused on making LR decisions. This could have been of influence on the test results.

Participants using a hand strategy in daily life reported to imagine this strategy during the test (”I imagined what my writing hand was”). Imagining the hand strategy could include motor imagery. If motor imagery was used while making LR decisions, the results of this study show motor imagery has no influence on LRC, as no difference was found.

One of the secondary questions of this study concerned a possible gender-based difference. It was expected that females experience a higher LRC than males on self-report as well as on the experimental test. Results showed no difference on the objective measures, but a difference was found on self-report, with females experiencing more LRC than males. This is in agreement with the hypothesis and earlier studies (Hannay et al., 1990; Jordan et al., 2006; Ocklenburg et al., 2011). An explanation could be that females underestimate themselves on LRC tests. Jordan and colleagues (2006) explained this underestimation by suggesting that females are more prone to rate themselves less skilled in making LR decisions than males.

The *Bergen Left-Right Discrimination Test* as used in the current study involves mental rotation. There is evidence that males outperform females in mental rotation tasks (Linn & Petersen, 1985). Existing studies show us contrary results whether mental rotation is involved in LRC, which they presented as the reason for the gender difference in LRC tests (Hirnstein et al., 2009; Ocklenburg et al., 2011). In this study no difference was found for gender on the objective measure, even though mental rotation was involved. This allows for Ocklenburg's (2011) outcome that mental rotation does not influence LRC, but is in contradiction with their outcome of a gender difference in LRC.

Another secondary question was based on handedness. No difference for handedness on LRC was found, which confirms the hypothesis. A limitation should be made on the number of left and right handed participants included in the study. Only 7 left-handed participants were included in this study, against 73 right-handed participants. Because of this small left handed group results are not reliable, since this large difference could have been of influence on the results.

This study was also aimed at the possible relation between LRC and numeracy. Numeracy was tested because of the consistency of LRC and dyscalculia in the Gerstmann Syndrome (Spellacy & Peter, 1978). Because LRC also exists in healthy humans, so might the consistency with dyscalculia. An effect was found for RT with participants showing a higher RT on the *Bergen Left-Right Discrimination Test* and a performance below cut off score on the *Digital Arithmetic Test.* This result confirms the hypothesis; participants with higher LRC showed reduced results on the numeracy test, which could imply a relation between LRC and dyscalculia in healthy humans. A limitation should be made. The *Digital Arithmetic Test* is not a test specific for dyscalculia, but to test numeracy. This study can only conclude a connection between LRC and lower numeracy. Future studies could include a dyscalculia test instead of the numeracy test to support a connection of LRC and dyscalculia in healthy humans.

Also, participants were asked if they were diagnosed with dyscalculia. No effect was found. A limitation should be mentioned; only one participant reported to be diagnosed with dyscalculia. A future study could compare LRC in equal groups of participants diagnosed with dyscalculia and controls.

Not examined in prior studies, to my knowledge, is the genetic component in LRC. This study included a genetic related question if a family member experienced LRC. No effects were found both for accuracy and RT. A limitation is the lack of objective measures of the genetic factors as these results were derived only through self-report. It could be interesting to further examine the genetic component in LRC by objective measures.

In short, no difference was found whether the hands were in a visible and congruent state compared to invisible and incongruent. The use of a hand strategy is not the cause of the inter-individual differences, although this does not mean that using a strategy is not of influence on LR performance, further research on strategy can be helpful. A gender-based difference was found only on self-report. No difference was found on the objective measure. This supports the initial assumption that mental rotation is not involved in LRC and shows females underestimate themselves on the LRC test compared to males. For handedness no difference was found. Numeracy and LRC showed an effect on RT; higher LRC showed a higher RT on the numeracy test. The numeracy test was a subtraction test. Subtraction activates both left and right parietal lobes (Chochon, Cohen, van de Moortele, & Dehaene, 1999), which could imply LRC is linked to both hemispheres and not linked particularly on the left hemisphere as considered by Hirnstein (2009). Research on brain regions could be of use to determine a different pattern in human's experiencing LRC and provide an explanatory direction on inter-individual differences in LRC.

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Appendix 1 – Left-Right Strategy Questionnaire

Hoe onderscheid jij links van rechts?

Er zijn verschillende manieren om links en rechts van elkaar te onderscheiden. We zijn benieuwd hoe u dat doet. Hieronder worden een aantal alternatieven gegeven, ook is het mogelijk dat u een andere manier gebruikt, die hier niet genoemd staat.
Omcirkel de manier die u het **meest gebruikt** of beschrijf de manier die u gebruikt, indien deze niet bij de antwoordmogelijkheden staat.

1. Duim en wijsvinger in een hoek van 90 graden houden; Bij de linkerhand vormt dit een “L” en bij de rechterhand een omgekeerde “L”.

2. Nagaan wat je schrijfhand is; dit is links/rechts.

3. Een sieraad dragen aan een bepaalde hand.

4. Nagaan aan welke kant van de weg je rijdt; dit is rechts.

5. Ik gebruik geen strategie.

6. Anders.