Journal of Intercultural Communication Research

ISSN: 1747-5759 (Print) 1747-5767 (Online) Journal homepage: http://www.tandfonline.com/loi/rjic20

Koreans and Germans: Cultural Differences in Hand Movement Behaviour and Gestural Repertoire

Zi Hyun Kim & Hedda Lausberg

To cite this article: Zi Hyun Kim & Hedda Lausberg (2018): Koreans and Germans: Cultural Differences in Hand Movement Behaviour and Gestural Repertoire, Journal of Intercultural Communication Research, DOI: 10.1080/17475759.2018.1475296

To link to this article: https://doi.org/10.1080/17475759.2018.1475296

Published online: 23 May 2018.

JOURNAL OF INTERCULTURAL COMMUNICATION RESEARCH, 2018
https://doi.org/10.1080/17475759.2018.1475296

Routledge
Taylor & Francis Group

Koreans and Germans: Cultural Differences in Hand Movement Behaviour and Gestural Repertoire

Zi Hyun Kim and Hedda Lausberg

Department of Neurology, Psychosomatic Medicine and Psychiatry, Institute of Health Promotion and Clinical Movement Science, German Sport University Cologne, Cologne, Germany

ABSTRACT
The present study compares hand movement behaviour and gestural repertoire between the Korean and German participants. Video clips of the hand movement behaviour of participants during description of their appreciation of dance stimuli were analysed with NEUROGES system. The German participants in general executed significantly more gestures than the Koreans. Concerning gesture repertoire, however, the Germans showed more emotional and emphasising gesture, and gesture presenting motion quality, while the Koreans displayed more pointing and pantomiming gestures. These differences are discussed in the context of the differences in cultural dimensions such as Individualism and Power Distance between both cultures.

ARTICLE HISTORY
Received 8 January 2018
Accepted 8 May 2018

KEYWORDS
Cultural difference; hand movement behaviour; gestural communication; dance appreciation; behavioural analysis

Introduction

The hand movements are displayed universally in human communication (Kelly, Church, & Alibali, 2017; Kendon, 1996; Levinson, 2006). However, little research has been conducted to study the cultural differences in hand movement behaviour. Those studies, furthermore, have not only used very different methods to classify the gestures which impedes the comparison of the study results, but also delivered a diversity of explanations concerning the cultural reasons that may contribute to the differences (Efron, 1972; Goldin-Meadow & Saltzman, 2000; Kita, 2009; Kita & Özyürek, 2003; Matsumoto, 2006; Urakami, 2014; Yammiyavar, Clemmensen, & Kumar, 2008).

Efron (1972), the pioneering researcher for studying cultural differences in body movements, examined gestures in the everyday life of first and second generation Sicilian and Lithuanian Jewish immigrants in New York City. He found that both groups displayed a high frequency of hand movements during interactions. Furthermore, there were distinct differences in gesture execution between traditional Jews and Italians: for example, large movements of shoulder joints by the Sicilians in contrast with more movements from elbow joints by the Lithuanian Jews. Notably, these culture-specific gestures disappeared in the second generation of immigrants who were more assimilated with the American culture. Hand movement behaviour in a study of non-verbal

CONTACT Zi Hyun Kim zh5735@hotmail.com

communication displayed by Indians, Chinese, and Danish in a usability testing situation, as examined with the coding system of gestures by Ekman and Friesen (1969), revealed different frequencies of adaptors (one part of body manipulates another part of body), illustrators (to illustrate what is being said verbally), and regulators (to regulate conversational flow and the pacing of the exchange) (Yammiyavar et al., 2008). In general, the Danish executed more gestures than the Indians, while the Chinese showed the lowest frequency of gestures. Among the three investigated types of gestures, only for adaptors a significant difference among the three cultures was found. The Danish displayed more adaptors than the Indians and the Chinese. Illustrators were used more often in China than in Denmark and India, whereas regulators were used more frequently in Denmark and India than in China. However, these differences were not statistically significant. Among the three types, the frequency of adaptors and illustrators appeared to be most sensitive to the culture, while the frequency of regulator display was similar across cultures. When interacting with their hearing and deaf children with toys and books, Taiwanese mothers produced more symbolic gestures to convey information than American mothers (Goldin-Meadow & Saltzman, 2000). The authors suggested that this difference in gesture rates possibly reflects that the Mandarin language used by the Taiwanese lends itself to higher gesture rates than English. The authors' hypothesis is consistent with McNeill's (1992) proposition that gesture and speech form an integrated system in all speakers. Unfortunately, it was not clearly described how McNeill's view is related to gesture frequency. Urakami (2014) reported cultural differences between Japanese and German gesture use when interacting with a map and a video walkthrough application for a table top monitor system. A map and a video navigation application with diverse commands such as "select destination" and "select area", etc. or "stop" and "turn right", etc. were shown to the participants, who were asked to imagine that the map or video they saw on the computer screen was actually on the black sheet. Participants were encouraged to perform any kind of gesture that they felt was appropriate for the command. Using a classification system with the three dimensions (1) form (physical description of hand shape and motion), (2) nature (the quality of the gesture), and (3) frame of reference (orientation of the gesture), she demonstrated that the German participants interacted more directly with the tabletop by touching it frequently. The Japanese participants were less engaged in direct interaction but they preferred to perform gestures in the space above the tabletop surface. To explain the results, the author referred to the high and low context model for the culture, which was originally proposed by Hall (1989), and explains the different communication styles of the corresponding people. The difference between the Germans and Japanese was attributed to differences in communication style in a low context culture that focuses on direct communication and information exchange (e.g. German) versus in a high context culture that prefers indirect communication and focuses on building relationships (e.g. Japanese). Furthermore, the participants generated different types of gestures according to its quality for the abstract commands. The German participants generated more abstract and symbolic gestures whereas the Japanese executed more metaphorical gestures. The abstract gesture is either symbolic, physical or metaphorical, but arbitrary gesture, while the metaphorical gesture refers to a metaphor. Based on these little vague definitions of the different type of gesture, the author suggested that this difference would indicate different ways of thinking. The German participants applied abstract rules and theoretical knowledge,

whereas the Japanese participants used associative thinking and practical knowledge. Kita and Özyürek (2003), who compared Japanese, Turkish, and English speakers, found that Japanese and Turkish participants represented manner and path of motion event in two separate gestures, whereas English participants depicted manner and path in a single gesture. It means that the gestural representation of participants using different languages depends on how the given language packages the two pieces of information, manner and path of motion event.

As the above review demonstrates, cultural differences in hand movement behaviour are a well-established finding. However, it was rarely discussed which aspect of culture plays a major role in explaining the observed cultural differences in hand movements. The interpretation is complicated by the fact that the definition of "culture" is the subject of controversial discussion (Eller, 2009). For the study of cross-cultural anthropology, however, "culture" can be defined in general as the customs and beliefs of one human group that make them different from another human group (Peoples & Bailey, 2012). Hence, cultural relativism, namely the difference of a culture relative to another one, is acknowledged as one of the most important aspects for the study of cross-cultural effects (Eller, 2009; Peoples & Bailey, 2012). Accordingly, Hofstede (2011) proposed a theoretical model for culture instead of considering single culture-specific factors like linguistic difference. Hofstede suggested that a culture can be classified by the use of four major indexed dimensions which are, as societal but not individual characteristics, the degree to which people in a society are integrated into groups: Power Distance measures the degree of inequality, Individualism (versus Collectivism) measures the degree of individualism, Masculinity (versus Femininity) measures the degree of distinction of emotional gender roles and Uncertainty Avoidance measures the degree of threatened feelings by ambiguous or unknown situations (see also Merrit, 2000). Hofstede's model, in which each dimension of the culture is explained with various corresponding societal conditions, seems to interpret cultural relativism better and more plausibly than any other single cultural factor such as the language or the way of spatial cognition (Kita, 2009). While Hofstede's cultural dimensions have often been discussed to explain cultural differences in the behavioural research for emotion and computer science (Fernández, Carrera, Sánchez, Paez, & Candia, 2000; Kashima et al., 1995; Markus & Kitayama, 1991; Matsumoto, Yoo, & Fontaine, 2008; Nasser Alvarez & Kavakli, 2012), thus far, they have never been considered in hand movement research.

In the present study, we explore cultural differences in hand movements between Germans, as an example of the European culture, and Koreans, as an example of the East Asian culture. The hand movements executed by the German and Korean participants as communicative actions during verbal description of their thoughts and feelings from the observed dance stimuli have been analysed by use of an algorithmic objective and reliable tool. Dance is another symbolic human action used to communicate (Popa Blanariu, 2013; Thomas, 1995). By analogy with the results of the above reviewed studies, we assume that specific hand movement types may exist that are executed more frequently by Germans than Koreans, and vice versa. With reference to the anthropological model by Hofstede (2011), especially the cultural dimensions like Power Distance and Individualism (versus Collectivism), and to the empirical findings of Yammiyavar et al. (2008), we hypothesize that in order to express their personal opinion, Germans generally carry out more gestures than Koreans.

Methods

Participants

The sample included 30 Korean (14 female, 16 male) and 30 German (16 female, 14 male) students between the ages of 20 and 35 years ($M \pm SD = 26.15 \pm 3.82$ years). All participants were recruited through flyers posted on the campus of the German Sport University Cologne and the University of Bonn, Germany, and they were paid for their participation in the study. All participants gave written consent before the investigation.

The Korean students had all grown up in Korea and moved to Germany for study purposes except for five female participants, who had finished their studies in Korea and stayed in Germany for other purposes. At the time of the experiment, thirteen Korean participants stayed in Germany less than one year. The rest seven Koreans spent in average four years in Germany for their study. The German students had all grown up in Germany. According to their own statements, all participants were right-handed.

Stimuli

Dance sequences were chosen as stimuli to elicit gesture production because motion stimuli are in general difficult to describe verbally and, therefore, function as effective elicitors to produce gestures (Morsella & Krauss, 2004).

To stimulate Korean and German participants equally, the dance sequences stem from both cultures. Four dance stimuli ($M \pm SD = 54.5 \pm 14.1$ s) comprised two ballet scenes and two Korean traditional dance scenes, each performed by one of the best professional dancers of the respective dance form. The video clips were prepared without sound in order to prevent the participants from being influenced by the music that accompanied the dance.

Procedures

Each participant was placed in a chair 3.5 m in front of a video camera (Panasonic, Model: SD = R-H85). The participants were videotaped in full shot during the whole experiment. The four videos of the dance scenes were projected without sound onto a screen with a size of 1.2 m × 1.6 m (height × width) located on the participants' left side. The experimenter, who is the first author, had her chair outside of the camera angle at a distance of 2 m of the participants' right side. She prepared a standardized sentence in German and Korean, which requests German or Korean participants to describe their thoughts and feelings from the observed dance scene verbally. The experimenter listened to the participants silently without interactive communication. So far, a constant condition relating to the language of instruction is given for the experiment. The participants were not informed about the fact that hand movement behaviour and gesture were subject to the investigation of the present study.

Measurements

The participants' hand movements and gestures that were executed by the participants during the verbal description of their thoughts and feelings evoked by the dance scene were submitted to analysis. Altogether 240 video clips ($M \pm SD = 63.7 \pm 18.4$ s) were prepared.

For the analysis, the NEUROGES system was chosen (Lausberg, 2013). NEUROGES is an objective and reliable research tool for the algorithmic analysis of hand movement behaviour and gesture. The system had been proven effective to distinguish nonverbal and gestural behaviour of different cultures such as German and Papuan cultures (Skomroch et al., 2014). Furthermore, the Function category of NEUROGES has been developed based on the Efron (1972) system, which had been originally employed for cultural studies. Hence, the NEUROGES system enables us to investigate aspects of nonverbal expression that we assume to differ between Germans and Koreans.

In seven steps comprising coding algorithm, the ongoing stream of hand/arm/shoulder movements (hereafter: hand movements) is segmented and classified into more and more fine-grained movement units. At each assessment step (category), specific movement criteria, which are based on psychological and neuropsychological research, are applied in order to segment the behaviour and to classify the resulting units of diverse movement values. The seven assessment steps are grouped into three modules: Module I (steps 1–3) deals with aspects of hand movement behaviour related to specific neuropsychological processes. For example, the Structure category (step 2) with five classifying movement values, *irregular, repetitive, phasic, aborted,* and *shift* provides information about conceptualization processes by analysing the trajectory of the hand movement, and the Focus category (step 3) with six values (e.g. *within body*, *on body, in spac*e, etc.) refers to attention processes by analysing the location where the hand acts (Hogrefe, Rein, Skomroch, & Lausberg, 2016 for pictorial dictionary of the Structure and Focus category). The analyses of the Structure and Focus categories are concatenated resulting in concatenated StructureFocus values. Module II (step 4–5) focuses on the laterality of hand movement behaviour, including complex aspects such as dominance. It thereby addresses questions of hemispheric specialization and inter-hemispheric cooperation. Module III (step 6–7) analyses the function of hand movement values like *emotion/attitude, emphasis, egocentric deictic, pantomime, form presentation, spatial relation presentation* and *motion quality presentation*, etc., which includes the analysis of gestures. Notably, just as with Modules I and II, the Module III analysis is based on the visual appearance of the movement only, which refers to those aspects of the function of a hand movement that are predetermined by its form. The coding algorithm and the precise definitions of the movement criteria, and the values are described in detail in the NEUROGES coding manual, which is available from the second author. NEUROGES is combined with the annotation tool ELAN. For its application with ELAN (https://tla.mpi.nl/tools/tla-tools/elan/), the coding sheet of NEUROGES has been transformed into an ELAN template file (http://www.neuroges-bast.info). The video subject to analysis is linked with the NEUROGES-ELAN template and then the behaviour is segmented by tagging units and annotating them with a value.

Two independent NEUROGES certified raters analysed the participants' hand movement behaviour with NEUROGES. The raters were not informed about the aims and hypotheses of the study. Furthermore, the videos were analysed without sound to avoid possible influences by the speech on the raters. The first rater coded 100% of the data whereas the second rater coded 25% of the data to establish inter-rater agreement (IA). IA for the Activation category was calculated as the ratio between the total length of overlaps from both annotators and the total length of movement units from both annotators (Compare Annotators' Ratio by Petermann, Skomroch, & Dvoretska, 2013). IA on all other NEUROGES categories of Module I was established calculating the EasyDIAg Cohen's kappa according to Holle and

Rein (2015). The EasyDIAg Cohen's kappa not only takes into account the categorization of values but also the temporal overlap of the raters' annotations. In addition, the raw agreement was measured which represents the number of agreeing on cases divided by the total number of cases (Holle & Rein, 2013). The Compare Annotators' Ratio scores, the EasyDIAg Cohen's kappa scores, and the raw agreement scores for the NEUROGES values are presented in the Appendix. A current review of the inter-rater reliability of the NEUROGES system (Lausberg & Sloetjes, 2016), which included 18 empirical studies employing the NEUROGES-ELAN system, was taken as a frame of reference for the assessment of the inter-rater agreement scores in the present study. With reference to this review, the agreement scores in the present study revealed a substantial strength of inter-rater reliability.

Statistical analysis

First, descriptive statistics were conducted. Only those hand movement values, which were executed by more than ten of thirty participants from each cultural group and for which the frequency score showed a normal distribution, were taken into account for repeated measures ANOVA analyses. For each hand movement value of NEUROGES category, the frequency distribution of the participant was calculated. The analyses were conducted separately for each NEUROGES category. The frequency scores (number of units of each value per minute, e.g. 3 *phasic* units per minute) were submitted to repeated measures ANOVA using SPSS (IBM SPSS Statistics Version 22). Bonferroni correction was used for multiple comparison analysis.

Results

As usual in the analyses with the univariate repeated measures ANOVA, we report significant results of the multivariate and univariate tests with F-value, degrees of freedom (df), and p-value. For the significant post hoc pairwise comparisons, descriptive statistics are given with the p-value (Hinton, McMurray, & Brownlow, 2014).

The multivariate tests showed a significant effect of the between-subjects factor Culture on the Activation category ($F = 5.862$; df = 2.57; $p = .005$). The univariate tests revealed significant differences in hand movement behaviour for left hand *movement* ($F = 5.57$; df = 1, 58; $p = .022$) and right hand *movement* ($F = 11.691$; df = 1, 58; $p = .001$) units. Post hoc pairwise comparisons revealed that with either hand the German participants executed more *movement* units (left hand: $M \pm SD = 6.65 \pm .43$; right hand = $7.0 \pm .42$) than the Koreans ($5.23 \pm .43$; $4.91 \pm .42$).

In the concatenated StructureFocus category, the multivariate tests provided a significant effect of Culture ($F = 3.612$; df = 14, 45; $p = .001$). The univariate tests showed significant differences for *phasic in space* (left hand: $F = 11.535$; df = 1, 58; $p = .001$; right hand: $F = 26.375$; df = 1, 58; $p < .001$), *repetitive in space* (left hand: $F = 4.265$; df = 1, 58; $p = .043$; right hand: $F = 11.32$; df = 1, 58; $p = .001$), *irregular within body* (left hand: $F = 6.367$; df = 1, 58; $p = .014$; right hand: $F = 4.158$; df = 1, 58; $p = .046$), left hand *phasic on attached object* ($F = 7.648$; df = 1, 58; $p = .008$), and left hand *repetitive on body* ($F = 5.798$; df = 1, 58; $p = .019$) units. Post hoc pairwise comparisons revealed that with either hand German participants carried out significantly more *phasic in space* (left hand: $M \pm SD = 4.63 \pm .33$; right hand: $4.80 \pm .3$), *repetitive in space* (left hand: $M \pm SD = 2.5 \pm .27$; right hand: $3.05 \pm .27$),

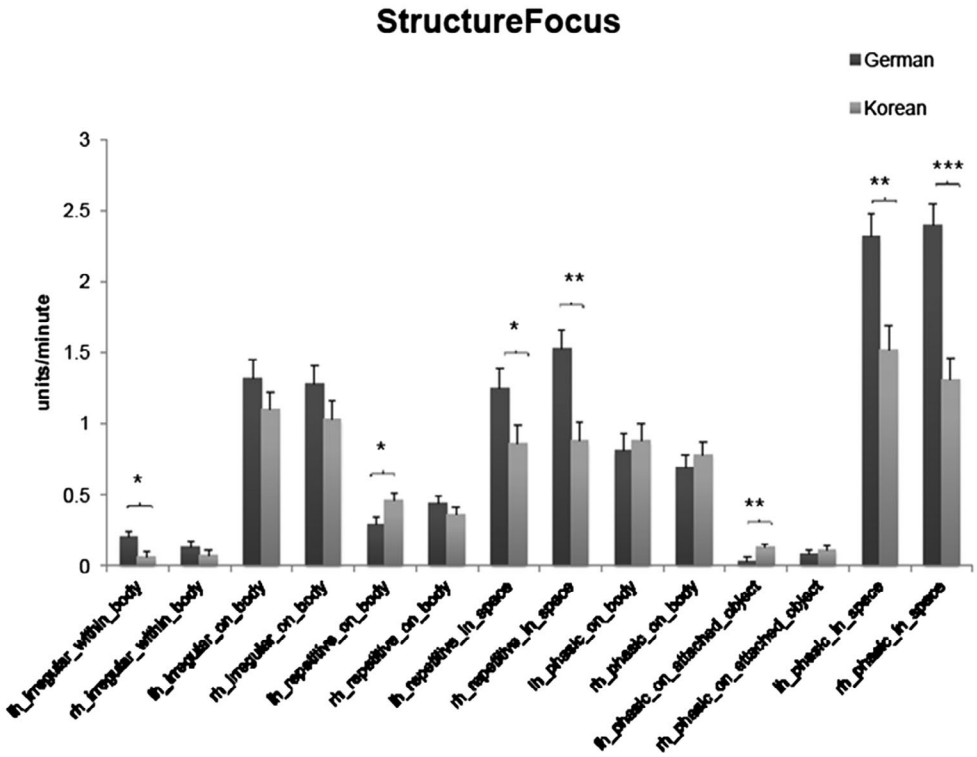

Figure 1. Number of StructureFocus value units per minute executed by the German and Korean participants.
Notes: Error bars indicate the calculated standard errors. (*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.) Bonferroni correction was used for multiple comparison analysis.

and *irregular within body* (left hand: $M \pm SD = .41 \pm .08$; right hand: $.68 \pm .14$) units than the Koreans. In contrast, Korean participants executed significantly more left hand *repetitive on body* ($M \pm SD = .92 \pm .1$) and left hand *phasic on attached object* ($.267 \pm .05$) units than the Germans ($M \pm SD = .58 \pm .1$ and $.07 \pm .05$) (see Figure 1).

The multivariate tests showed no significant effect of Culture on the Contact category. The univariate tests revealed significant differences in hand movement behaviour for *act on each other* ($F = 6.355$; df = 1, 58; $p = .014$) units. According to post hoc pairwise comparisons, Germans showed more *act on each other* ($M \pm SD = 4.36 \pm .46$) units than Korean participants ($2.72 \pm .46$).

In the Formal Relation category, the multivariate and univariate tests showed no significant effects of Culture.

In the Function category, the multivariate tests showed a significant effect of Culture ($F = 2.653$; df = 27, 32; $p = .004$). According to the univariate tests, significant differences in hand movement behaviour between the German and Korean participants occurred for *emphasis* (bimanual: $F = 44.528$; df = 1, 58; $p < .001$; right hand: $F = 8.344$; df = 1, 58; $p = .005$), bimanual *emotion/attitude* ($F = 4.206$; df = 1, 58; $p = .045$), bimanual *motion quality presentation* ($F = 12.607$; df = 1, 58; $p = .001$), left hand *egocentric deictic* ($F = 9.360$; df = 1, 58; $p = .003$), left hand *pantomime* ($F = 4.027$; df = 1, 58; $p = .049$), and left hand

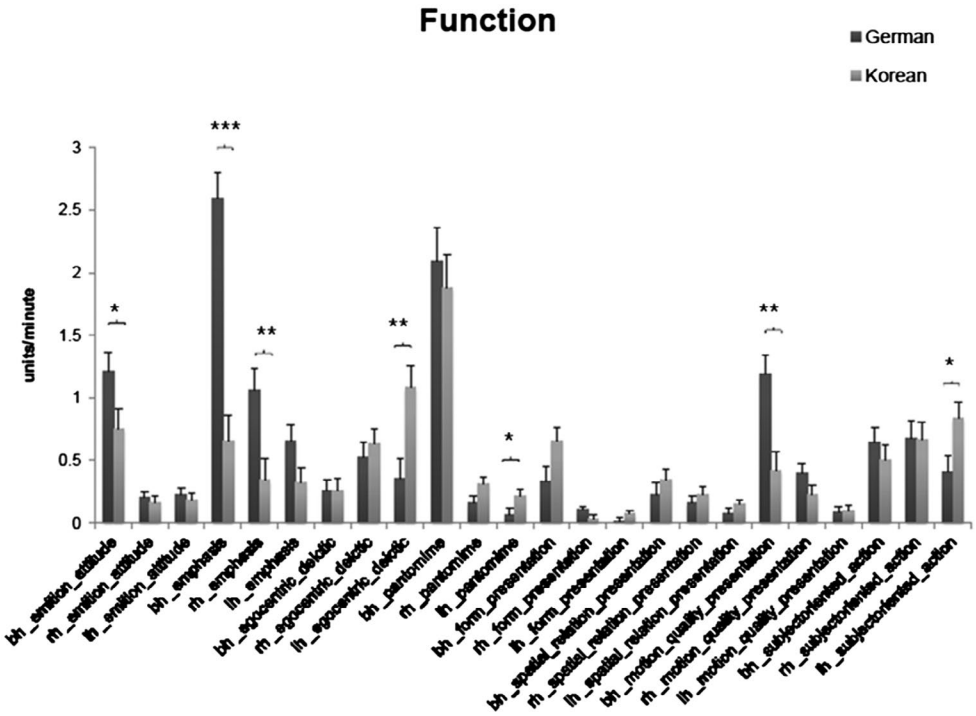

Figure 2. Number of Function value units per minute executed by the German and Korean participants. Notes: Error bars indicate the calculated standard errors. (*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.) Bonferroni correction was used for multiple comparison analysis.

subject-oriented action ($F = 5.061$; df = 1, 58; $p = .028$) units. Post hoc pairwise comparisons revealed that Germans executed more *emphasis* (bimanual: $M \pm$ SD = 2.6 ± .21; right hand: 1.06 ± .18), bimanual *emotion/attitude* (1.21 ± .16), and bimanual *motion quality presentation* (1.19 ± .15) units than Korean participants. In contrast, the Koreans showed more left hand *egocentric deictic*, left hand *pantomime*, and left hand *subject-oriented action* ($M \pm$ SD = 1.08 ± .17; .21 ± .05 and .83 ± .14) units than German participants ($M \pm$ SD = .35 ± .17; .06 ± .05 und .40 ± .14) (see Figure 2).

The multivariate tests showed no significant effect of Culture on the Type category, in which each Function value is further specified by Type values. The univariate tests revealed significant differences between German and Korean participants for *back toss – emphasis* (bimanual: $F = 4.299$; df = 1, 58; $p = .043$; right hand: $F = 4.661$; df = 1, 58; $p = .035$), *palm out – emphasis* (bimanual: $F = 44.643$; df = 1, 58; $p < .001$; right hand: $F = 5.502$; df = 1, 58; $p = .022$), bimanual *manner – motion quality presentation* ($F = 9.706$; df = 1, 58; $p = .003$), bimanual *shape – form presentation* ($F = 4.911$; df = 1, 58; $p = .031$), bimanual *shrug – emotion/attitude* ($F = 4.864$; df = 1, 58; $p = .031$), bimanual *superimposed – emphasis* ($F = 7.632$; df = 1, 58; $p = .008$), left hand *external target – egocentric deictic* ($F = 7.384$; df = 1, 58; $p = .009$), left hand *self – egocentric deictic* ($F = 4.251$; df = 1, 58; $p = .044$), left hand *transitive – pantomime* ($F = 5.523$; df = 1, 58; $p = .022$), right hand *closing – emotion/attitude* ($F = 4.864$; df = 1, 58; $p = .031$), and right hand *dynamics – motion quality presentation* ($F = 5.518$; df = 1, 58; $p = .022$) units. Corresponding post hoc pairwise analyses showed that German participants carried out more *back toss – emphasis* (bimanual: $M \pm$ SD = .42 ± .09;

right hand: .24 ± .05), *palm out – emphasis* (bimanual: *M* ± SD = 1.77 ± .16; right hand: .49 ± .12), bimanual *superimposed – emphasis* (.27 ± .05), bimanual *manner – motion quality presentation* (*M* ± SD = 1.05 ± .15), right hand *dynamics – motion quality presentation* (.13 ± .03), and bimanual *shrug – emotion/attitude* (.78 ± .16) units than Korean participants (*M* ± SD = .15 ± .09; .07 ± .05; .22 ± .16; .11 ± .12; .07 ± .05; .38 ± .15; .03 ± .03 and .27 ± .16), respectively. Korean participants showed significantly more bimanual *shape – form presentation* (*M* ± SD = .48 ± .08), right hand *closing – emotion/attitude* (.07 ± .02), left hand *external target – egocentric deictic* (.58 ± .1), left hand *self – egocentric deictic* (.32 ± .08), and left hand *transitive – pantomime* (.19 ± .05) units than Germans (*M* ± SD = .23 ± .08; .02 ± .02; .19 ± .1; .08 ± .08 and .03 ± .05).

Discussion

The present study on hand movement behaviour and gesture revealed culture-specific differences between Koreans and Germans. While the German participants executed with either hand significantly more *phasic* and *repetitive in space* movements than the Koreans, the latter displayed with the left hand significantly more *repetitive on the body* and *phasic on attached object* movements. Further analysis revealed that the Germans showed significantly more bimanual *emotion/attitude*, bimanual and right hand *emphasis*, and bimanual *motion quality* gestures, while the Koreans displayed more left hand *egocentric deictic*, left hand *pantomime*, bimanual *shape form*, and left hand *subject-oriented action*. These findings are in line with the original study hypotheses that the Germans would generally carry out more gestures than the Koreans during verbal description of their appreciation of dance stimuli, but the Germans and the Koreans show culture-specific differences in certain hand movements and gestures.

Germans carried out more *phasic in space* and *repetitive in space* units than the Korean participants. *Phasic* and *repetitive* units are characterized by a phase structure, i.e. preparation, complex and retraction phases. While *phasic* units may be based on novel conceptualizations, *repetitive* units rely on routine conceptualizations (Lausberg, 2013). Hand movements oriented *in space*, except for movements that serve to fan fresh air, are functionally gestures. Thus, Germans used more gestures than Koreans when presenting their personal appreciation of the dance stimuli.

The difference in gesture frequency between German and Korean participants could be ascribed to the difference in Individualism and Power Distance of the both cultures, which are the main dimensions to characterize the culture by Hofstede (2011). Using the Display Rule Assessment Inventory method, Matsumoto et al. (2008) investigated overall expressivity of emotion for 33 cultures in 6,000 participants. They found that participants of a culture with a higher degree of individualism showed a higher overall expressivity endorsement than those of a culture with lower individualism. Correspondingly, Germans showed higher overall expressivity than Koreans. Our findings that the Germans executed significantly more gestures than the Koreans can be explained by the Hofstede's Model, whereupon the Germans with a higher degree of individualism and higher overall expressivity endorsement show generally higher gesture rate than the Koreans with lower individualism and lower overall expressivity. Comparable results were reported by Yammiyavar et al. (2008), who found that Danish in general executed more gestures than Chinese. Likewise, Urakami (2014) reported that Germans executed gestures more frequently than Japanese.

At first glance, our findings seem to contradict the observation that Taiwanese mothers produced more gestures to convey information than American mothers when they taught their children with toys and books (Goldin-Meadow & Saltzman, 2000). However, considering that the purpose of mothers' gestures is to teach their children, one another dimension of Hofstede (2011) for characterization of the culture, namely the Power Distance, provides an explanation. Because the mothers relative to their children have a larger Power Distance in Taiwan, they may show higher gesture frequency when teaching and instructing their children than the mothers in America, who have a smaller Power Distance to their children. The differences in the study design, description of one's personal thoughts versus teaching the own child, might explain the differences between the current study and the study by Goldin-Meadow and Saltzman (2000).

Furthermore, in the present study compared to the German participants, the Korean participants showed more left hand *repetitive on body* units, for example, repetitively touching the thigh, and more left hand phasic on attached object units, for example, straightening their clothes. It is noteworthy that for these types of hand movements the significant cultural differences were found only for the left hand. Since the left hand is primarily controlled by the right hemisphere, this laterality result suggests an association with emotional regulation processes, which are predominant in the right hemisphere (Lausberg, 2013; Lausberg, Zaidel, Cruz, & Ptito, 2007). One possible explanation for the preference of the left hand is that Koreans are reared to follow complicated politeness rules for inter-personal conversations (Dix, 2012). These imply the restriction of body movement during the conversation. Such constraining rules can bring Korean individuals into inner conflicts when they have the impulse to use gesture and other forms of expressive body movement to describe their feelings and personal impressions, as required in the present study. Since in right-handers, as investigated in our study, the left hand is less under conscious control than the right hand, the Korean participants' left hand manipulations of the body or of the clothes and jewellery might reflect this internal conflict. The finding is in line with the fact that, in general, right-handers prefer the left hand for movements oriented on attached object (Lausberg, 2013). The German participants displayed self-touching behaviour not only unilaterally with the left hand but also with both hands in form of hand-to-hand movements, as they also showed significantly more act on each other units as compared to the Koreans. These movements provide strong sensory-motor stimulation, as each hand moves, feels, and is felt at the same time, and they effectively serve arousal regulation (Freedman & Bucci, 1981; Lausberg, 2013).

Concerning conceptual hand movements and gestures, the German participants showed more bimanual *emotion/attitude* (notably bilateral shrug) for expression of emotions or attitudes, using bimanual and right hand *emphasis* (notably bimanual and right hand *back toss*, bimanual and right hand *palm out*, bimanual *super imposed*) to emphasize their thoughts, and using bimanual *motion quality presentation* (notably bimanual *manner* and right hand *dynamics*) to emphasize the quality of the observed dance movements than the Koreans. In contrast, the Koreans executed more left hand *subject-oriented action*, which serve to change the individual's physical or mental state, as well as left hand *egocentric deictic* (notably left hand *external target* and left hand *self*), indicating toward someone or some place, and left hand *pantomime* (notably left hand *transitive*), in which the gesturer pretends "as if" to perform a specific action.

More specifically, Germans executed significantly more bilateral *shoulder shrugs* than Koreans. Comparable results were reported by Skomroch et al. (2014) who found that Germans carried out significantly more shrug units than Papua New Guineans. Thus, our data support the proposition of Darwin, Cummings, and Duchenne (1872) that shrugs are a universal behavioural phenomenon. However, with regard to the significantly higher frequency in the German group, our data further suggest that in addition, shrugs become conventionalized signs in certain cultures. The conventionalization entails a higher frequency of display. Koreans displayed more right hand closing units, by shifting the hand to close the body in the rest position. As discussed above, Koreans, in general, have to follow complicated politeness rules for inter-personal conversations (Dix, 2012). They are requested to keep their hands stacked during conversations with an elder or unfamiliar people. Because of such restricting rules, it is likely that the Koreans in the present study displayed more *closing* units during the verbal description of their thoughts to the unfamiliar experimenter.

Germans showed significantly more bimanual and right hand *back toss – emphasis*, bimanual and right hand *palm out – emphasis*, and bimanual *superimposed – emphasis* gestures than the Koreans. These various forms of *emphasis* gestures set accents on speech. Thus, in the present study, Germans tended to underline more strongly with a gesture the importance of certain verbal utterance when describing their impressions about the dance stimuli. It is a typical feature of individualist society according to Hofstede (2011) that personal opinion is more strongly expected than that in the collectivist society.

The gesture type *motion quality presentation* reveals a manner or a dynamics of moving. The Germans executed more bimanual *manner – motion quality presentation* and more right hand *dynamics – motion quality presentation*. In the present study, these gestures could have been used to depict the dynamic motions of the dance stimuli. In contrast, the Koreans executed more left hand *external target – deictic* and left hand *self – deictic* units, also pointing gestures. In the *external target – deictics*, the left hand mainly pointed to the wall on the participants' left side where the dance stimuli had been projected. *Deictics* referring by means of a sign to a visually present object can strongly help to depict semantic characteristics of referents (Qu & Chai, 2008). In the present study, the Korean participants rather referred to the dance stimuli by pointing to the location where the stimuli had been projected than by directly depicting the content of the dance stimuli with *motion quality presentation* gestures.

Furthermore, the Korean participants used more bimanual *shape – form presentation* and left hand *transitive – pantomime* units than the German participants. Thus, the perceptual focus of the Koreans might have focused more strongly on the static forms created by the dance than on the movement dynamics. This seemingly culture-specific focus is also reflected in Korean dance. In contrast to the classical ballet, traditional Korean dance focuses on the creation of dancing figure formed by costumes covering the dancer's body with extraordinary long arm sleeves.

In conclusion, the present findings provide an evidence for the sociocultural dependence of the hand movement behaviour and gestural repertoire between the Koreans and the Germans. In general, Germans showed higher gesture rate than Koreans in response to dance stimuli. The preponderance for certain types of hand movements and gestures in one culture as compared to the other one strongly suggest that not only the language difference (Kita, 2009), but likewise cultural factors such as degree of Individualism and

Power Distance (Hofstede, 2011) substantially coin the hand movement behaviour and gestural repertoire of a culture.

Considering given circumstances for everyday life for a foreign student in Germany, we assumed that the effect of communicative mannerism on the hand movement behaviour of the seven Korean participants, who stayed in Germany about four years at the time of the experiment, would not be dominant, because it is in general not easy to have intensive contacts with the German culture during their everyday life. However, we recommend further controlled and fine-grained studies for the cultural differences in some specific gestures, such as *egocentric deictic, emotion/attitude, emphasis*, and *motion quality presentation* units, to explain the relation between gestural behaviour and culture with more extensive sociocultural aspects.

Disclosure statement

No potential conflict of interest was reported by the authors.

Notes on contributors

Zi Hyun Kim (Ph. D., German Sport University Cologne, 2016) is interested in cross-cultural comparison studies on hand movement behaviour and dance movement.

Hedda Lausberg is a Full Professor in the Department of Neurology, Psychosomatic Medicine and Psychiatry at German Sport University Cologne. She is a Neurologist, Specialist in Psychosomatic Medicine and Psychotherapy, Psychiatrist.

References

Darwin, C. R., Cummings, M. M., & Duchenne, G.-B. (1872). *The expression of the emotions in man and animals*. London: John Murray.

Dix, R. (2012). *Cement, cabbages & cars: Cross-cultural misadventures in the land of the morning calm*. Korea: Monsoon Books.

Efron, D. (1972). *Gesture, race and culture: A tentative study of some of the spatio-temporal and linguistic aspects of the gestural behavior of Eastern Jews and Southern Italians in New York City, living under similar as well as different environmental conditions*. The Hague: Mouton (Original work published 1941).

Ekman, P., & Friesen, W. V. (1969). The repertoire of nonverbal behavior: Categories, origins, usage, and coding. *Semiotica, 1*, 49–98.

Eller, J. D. (2009). *Cultural anthropology: Global forces, local lives*. New York, NY: Routledge.

Fernández, I., Carrera, P., Sánchez, F., Paez, D., & Candia, L. (2000). Differences between cultures in emotional verbal and non-verbal reactions. *Psicotheme, 12*, 83–92.

Freedman, N., & Bucci, W. (1981). On kinetic filtering in associative monologue. *Semiotica, 34*, 225–250.

Goldin-Meadow, S., & Saltzman, J. (2000). The cultural bounds of maternal accommodation: How Chinese and American mothers communicate with deaf and hearing children. *Psychological Science, 11*(4), 307–314.

Hall, E.T. (1989). *Beyond culture. Anchor* (Books ed.). New York, NY: Anchor Books.

Hinton, P. R., McMurray, I., & Brownlow, C. (2014). *SPSS Explained* (2nd ed.). London: Routledge.

Hofstede, G. (2011). Dimensionalizing cultures: The Hofstede model in context. *Online readings in psychology and culture, 2*(1), 1–26. doi:10.9707/2307-0919.1014

Hogrefe, K., Rein, R., Skomroch, H., & Lausberg, H. (2016). Co-speech hand movements during narrations: What is the impact of right vs. left hemisphere brain damage? *Neuropsychologia, 93*, 176–188. doi:10.1016/j.neuropsychologia.2016.10.015

Holle, H., & Rein, R. (2013). Assessing interrater agreement of movement annotations. In H. Lausberg (Ed.), *Understanding body movement and gesture. A guide to empirical research on nonverbal behaviour* (pp. 261–277). Frankfurt a.M.: Peter Lang.

Holle, H., & Rein, R. (2015). EasyDIAg: A tool for easy determination of interrater agreement. *Behavior Research Methods., 47*(3), 837–847. doi:10.3758/s13428-014-0506-7

Kashima, Y., Yamaguchi, S., Kim, U., Choi, S.-C., Gelfand, M. J., & Yuki, M. (1995). Culture, gender, and self: A perspective from individualism-collectivism research. *Journal of Personality and Social Psychology, 69*(5), 925–937. doi:10.1037/0022-3514.69.5.925

Kelly, S. D., Church, R. B., & Alibali, M. W. (2017). Understanding gesture: Description, mechanism and function. In R. B. Church, M. W. Alibali, & S. D. Kelly (Eds.), *Why gesture?: How the hands function in speaking, thinking and communicating* (pp. 3–10). Amsterdam: John Benjamins B.V. doi: 10.1075/gs.7

Kendon, A. (1996). An agenda for gesture studies. *Semiotic Review of Books, 7*(3), 8–12.

Kita, S. (2009). Cross-cultural variation of speech-accompanying gesture: A review. *Language and Cognitive Processes, 24*, 145–167.

Kita, S., & Özyürek, A. (2003). What does cross-linguistic variation in semantic coordination of speech and gesture reveal? Evidence for an interface representation of spatial thinking and speaking. *Journal of Memory and Language, 48*, 16–32.

Lausberg, H. (2013). The NEUROGES coding system. In H. Lausberg (Ed.), *Understanding body movement: A guide to empirical research on nonverbal behaviour: With an introduction to the NEUROGES coding system* (pp. 113–168). Frankfurt a.M.: Peter Lang.

Lausberg, H., & Sloetjes, H. (2016). The revised NEUROGES-ELAN system – An objective and reliable interdisciplinary analysis tool for nonverbal behavior and gesture. *Behavior Research Methods, 48*(3), 973–993. doi:10.3758/s13428-015-0622-z

Lausberg, H., Zaidel, E., Cruz, R. F., & Ptito, A. (2007). Speech-independent production of communicative gestures: Evidence from patients with complete callosal disconnection. *Neuropsychologia, 45*(13), 3092–3104.

Levinson, S. C. (2006). On the Human "Interaction Engine". In N. J. Enfield & S. C. Levinson (Eds.), *Roots of human sociality: Culture, cognition and interaction*, 39–69. Oxford: Berg.

Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review, 98*(2), 224–253.

Matsumoto, D. (2006). Culture and nonverbal behavior. In V. Manusov & M. L. Patterson (Eds.), *The SAGE handbook of nonverbal communication*. SAGE, 219–235.

Matsumoto, D., Yoo, S. H., & Fontaine, J. (2008). Mapping expressive differences around the world the relationship between emotional display rules and individualism versus collectivism. *Journal of Cross-Cultural Psychology, 39*(1), 55–74.

McNeill, D. (1992). *Hand and mind: What gestures reveal about thought*. Chicago, IL: University of Chicago Press.

Merrit, A. (2000). Culture in the cockpit: Do Hofstede's dimensions replicate? *Journal of cross-cultural psychology, 31*(3), 282–301.

Morsella, E., & Krauss, R. M. (2004). The role of gestures in spatial working memory and speech. *The American Journal of Psychology, 117*(3), 411–424.

Nasser Alvarez, K., & Kavakli, M. (2012). Influence of culture in multimodal interfaces: Gesture behavior between Anglo-Celtic and Latin Americans. *Proceeding of MMEDIA 2012: The fourth international conferences on advances in multimedia* (pp. 148–154), Chamonix, France.

Peoples, J., & Bailey, G. (2012). *Humanity: An introduction to cultural anthropology* (9th ed.). Belmont, USA: Wadsworth.

Petermann, K., Skomroch, H., & Dvoretska, D. (2013). Calculating temporal interrater agreement for binary movement categories. In H. Lausberg (Ed.), *Understanding body movement: A guide to empirical research on nonverbal behaviour: With an introduction to the NEUROGES coding system*, 253–260. Frankfurt a.M.: Peter Lang.

Popa Blanariu, N. (2013). Towards a framework of a Semiotics of dance. *CLCWeb: Comparative literature and culture, 15*(1), doi:10.7771/1481-4374.2183

Qu, S., & Chai, J. Y. (2008). Beyond attention: The role of deictic gesture in intention recognition in multimodal conversational interfaces. *Proceedings of the 13th international conference on intelligent user interfaces* (pp. 237–246), Maspalomas, Gran Canaria, Spain.

Skomroch, H., Lausberg, H., Unterladstetter, V., Sandler, M., Strunk, J., & Himmelmann, N.P. (2014, November 21–22). Patterns of hand movement and prosodic behavior across language groups. *Mapping Multimodal Dialogue 2*. Leuven, Belgium.

Thomas, H. (1995). *Dance, modernity and culture*. London: Routledge.

Urakami, J. (2014). Cross-cultural comparison of hand gestures of Japanese and Germans for tabletop systems. *Computers in Human Behavior, 40*, 180–189.

Yammiyavar, P., Clemmensen, T., & Kumar, J. (2008). Influence of cultural background on non-verbal communication in a usability testing situation. *International Journal of Design, 2*, 31–40.

Appendix. Inter-rater agreement (IA) values

Inter-rater agreement as measured by the Compare Annotators' Ratio (Activation category) and the EasyDIAg Cohen's Kappa (all other NEUROGES categories)

Module I – activation values	Compare annotators' ratio
Left hand *movement*	0.85 ± 0.14
Right hand *movement*	0.86 ± 0.14

Module I – structure values	EasyDIAg Cohen's kappa	Raw agreement
Irregular	0.67	0.89
Repetitive	0.76	0.92
Phasic	0.66	0.85
Aborted	0.79	0.99
Shift	0.63	0.96

Module I – StructureFocus values	EasyDIAg Cohen's kappa	Raw agreement
Irregular within body	0.53	0.99
Irregular on body	0.75	0.93
Irregular on attached object	0.47	0.99
Irregular on separate object	0.57	1
Repetitive within body	1	1
Repetitive on body	0.75	0.97
Repetitive on attached object	0.4	1
Repetitive on separate object	0	1
Repetitive in space	0.91	0.98
Phasic within body	0.57	1
Phasic on body	0.66	0.94
Phasic on attached object	0.81	1
Phasic on separate object	0.54	1
Phasic in space	0.82	0.93

Module II – contact values	EasyDIAg Cohen's kappa	Raw agreement
Act on each other	0.66	0.92
Act as a unit	0.59	0.99
Act apart	0.72	0.87

Module II – formal relation values	EasyDIAg Cohen's kappa	Raw agreement
Right hand dominance	0.79	0.97
Left hand dominance	0.76	0.97
Symmetrical	0.68	0.87
Asymmetrical	0.5	0.89