Third-Culture Kid Pilots and Multi-Cultural Identity Effects on Pilots' Attitudes

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BACKGROUND: Current attempts to culturally tailor human factors training in aviation segregates cultural identities based on geopolitical, passport nationality, and is therefore poorly suited for (adult) 'Third Culture Kids' (TCKs) whose cross-cultural upbringing has led to the development of multicultural individual identities that do not reflect their passport nationalities. In this study, respondents' self-categorization of personal cultural identity, as opposed to passport nationality, was used to determine whether there were cultural differences in airline pilots' behaviors.

METHOD: A survey with items imported from established scales was distributed to pilots of an international airline to measure pilots' work values, flight management attitudes, and cultural dimensions, with respondents segregated into Western, TCK, or Asian cultural groups.

RESULTS: TCKs shared similar work values with Westerners, were similarly individualistic, had comparable preference for shallow command gradients, were similarly pragmatic in self-evaluation of performance under stress, and both had lower dependency and preference for rules and procedures. TCKs scored in the middle between Westerners and Asians in automation preference attitudes, and on the cultural dimensions of power distance and uncertainty avoidance. TCKs did not share any similarities with Asians at all.

DISCUSSION: The results show that TCKs were neither assimilated into a mainstream culture, nor culturally "middle of the pack" as may be expected from their "East meets West" backgrounds. Having identified TCK pilots' unique values, attitudes, and dimensions, practical implications include changing training design to better suit TCKs' cultural characteristics and the adaptation of airline management to cater for TCKs' work values.

KEYWORDS: diversity, international school, Hofstede's dimensions, Flight Management Attitudes Questionnaire, CRM.

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Culture instills in people systems of interconnected and unwritten rules which govern how they function both individually and collaboratively. Existing literature has demonstrated that there is a relationship between pilots' national culture and their work values and flight management attitudes,[6] with significant differences observed between Western and Asian cultures.[3,8] These studies, however, typically utilize geopolitical, passport nationality to segregate pilots into different cultural groups, and are therefore insufficiently representative of the growing population of globally nomadic, multicultural pilots whose passport nationalities may not be truly representative of their personal cultural identities, values, and attitudes. For example, 13% of Hong Kong nationals did not identify culturally as Hong Kongers.[9] Similarly, children of illegal immigrants in the United States have also been reported to have American personal identities without the corresponding passport nationality.[12] Cultural categorization by passport nationality may therefore misrepresent these multicultural individuals' attitudes on the flight deck.

A common reason for the mismatch between individuals' own cultural identity and their passport nationality is from spending significant parts of their developmental years outside their parents' "home" culture. Known as Third Culture Kids (TCKs), these individuals build relationships to and assimilate elements from both their "home" and "host" cultures, but never develop full ownership of any one culture. They consequentially

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form an interstitial "third" culture with a sense of belonging in relation to other people of similar background.[15] A "third culture" identity is most commonly observed in the children of immigrants or those who have accompanied parents on overseas postings. Even when individuals have never physically migrated internationally, a TCK identity can still be developed from having parents of different cultures, or through attendance in international schools (with different language and curriculum to "host" country national schools) which would create a daily transition between the home (domestic) and school (international) cultures.[15]

In spite of obvious differences between the refugee-immigrant child and the privileged international school student, TCKs from all of the above backgrounds can, in fact, be considered as a singular cultural nation.[15] The culture of a 'nation' is defined by its identity, values, and institutions.[11] TCKs of all backgrounds share a common identity of rootlessness, transience, and socially being "a part of and apart from" their peers.[5] Implicit values such as mobility, intercultural sensibility, adaptability, and acceptance of cultural diversity are also shared among all TCKs.[5,15] Institutions shared by TCKs include, for example, international schools, expatriate/immigrant communities, and the subcommunities of the sponsoring corporation or aid agency.[15]

Specifically, the TCK identity is restricted to only include individuals who have experienced cultural migration during their childhood years, to the exclusion of expatriates or migrants whose cultural relocation happens in later, adult life. This is because it is during adolescence when a person's sensibilities to rules and conceptions, interpersonal relations, and moral and religious ideals are formed,[18] and these are the dimensions which affect aircraft pilots' attitudes. In contrast, layers of culture that are acquired in adult life tend to be more changeable as they are generally more superficial and less embedded in an individual's personality.[11] Characteristics of TCK identities continue into adulthood as adult TCKs will have to continually hide aspects of their internal, globalized sensibilities and ideas whenever they attempt to blend in to that of the dominant society, thus reinforcing their sense of being different and inability to fit in.[18]

Existing literature in the education arena shows that TCKs are more likely to display Western-leaning dispositions. The preference for an English language education based on an internationally recognized syllabus means that the children of families who regularly relocate internationally will more likely attend international, Western syllabi schools.[4] It is therefore more likely for an ethnically Asian TCK to attend an English-medium, Western curriculum school (thereby picking up Western values), than it is for an ethnically Western TCK to go to an Asian-language school while growing up in Asia.[18]

The concept of third-culturalism is dissimilar to the concept of multiculturalism. While multiculturalism involves notions such as 'melting pot' or 'salad bowl' metaphors of integrative, plural cultural mosaics,[2] third-culturalism is founded on rootlessness[15] and of not belonging in any culture.[5] TCKs are neither integral parts of the foreign countries in which they grew up, nor do they feel at home in their country of citizenship.[19] The physical mobility that TCKs experience traps them in a state of constant transition which denies them the roots on which self-definition is constructed,[5,15] creating a "neither/nor" identity that distinguishes TCKs from individuals of singular cultures who have been exposed to foreign ideas. For example, children in modern Western countries who are exposed to foreign (including Asian) cultures through social media and world-wide entertainment will have more rooted (Western) beliefs from their stable home life,[18] and exposure to global media will have limited impact on their core identities.

Previous research on cultural issues in aviation human factors, where subjects were grouped by geopolitical nationality, identified antipodal attitudes between Western and Asian pilots. These are best replicated by socio-psychologist Geert Hofstede's cultural dimensions of individualism-collectivism (IDV), power distance (PD), and uncertainty avoidance (UA).[11,13] The IDV and PD dimensions affect crew interaction, group harmony, and the willingness of subordinates to speak up to the Captain with critical information, while UA addresses pilots' propensity to follow orders and standard operating procedures.[8,13] Engle[3] observed that IDV and PD are usually inverse, with cultures belonging into either one of two distinct groups of high or low context. In the high context group are Asians, with low IDV, high PD, and high UA; whereas the low context group is represented by Westerners with high IDV, low PD, and low UA. In general, high context Asian pilots had a greater preference for communications,[3] liked to share responsibilities,[3] were better at building group cohesiveness,[3] favored greater adherence to rules and procedures,[6] and had higher levels of automation reliance and preference,[6] but they would almost universally avoid questioning the actions or decisions of superiors.[3] They were also more rule oriented (representing high UA),[8] with individual events understood in consideration of a wide host of factors.[14] Contrarily, low context, Western pilots were much more self-reliant,[3] favoring greater independence from the organization[6] and less automation.[17] They communicated only on an as-needed basis,[3] applied more straightforward rules when considering the behavior of objects,[14] and displayed slightly more realistic attitudes to stress management.[6] Westerners were also less concerned with rules and procedures (low UA),[8] corresponding to a lower degree of adherence to regulations and standard operating procedures.[8]

The above cultural findings, however, cannot be generalized for the globally nomadic TCK group. Existing studies of the effects of cross-culture on the flight deck generally focus on team-level interaction between two or more pilots of different cultures working together on culturally mixed flight decks,[1,8] but there have been few attempts to investigate the impacts of individual-level culturally plural personal identities. The values and attitudes of TCK pilots, whose cultural identities do not conform to that of any geopolitical national group, need to be determined. While TCKs' Western-leaning characteristics[4,18] suggest that they are likely to display low context attitudes, such as greater self-reliance,[3] lower rule orientation,[8] and lower preference for automation,[17] other studies provide clues that TCKs

in the cockpit may possibly be different than Westerners on certain metrices such as communications (TCKs are likely to be better communicators owing to their greater experience in communicating between diverse groups[15]) and individualism (as TCKs lack a "mother culture" to adopt, their moral values are more directed to their own interpretation and judgement[15]).

It is necessary to investigate TCKs' values and attitudes within the unique occupational context of aircraft pilots. This is because pilots, as a result of their seniority and command-driven professional culture,[13] complementary skill sets,[20] and high regularity of training,[7] may display characteristics different from those found in cultural studies of other industries. Pilots, for example, have been found to have higher, but less nationally-varied, PD scores than those found in Hofstede's original sample.[13] Gathering information within this occupational context enables the identification of dimensions where national culture exerts an overwhelming influence on both the professional (pilot) and organizational (company) cultures.[1,13] The identification of strongly rooted and change-resistant cultural dimensions can inform training design so that the focus can be placed on dimensions that are more easily amenable to improve training efficiency.[17]

This study considers TCKs as a cultural category separate from Western and Asian groups in an attempt to identify whether a TCK background will create detectable cultural differences. Using a survey, pilots' work values and flight management attitudes were assessed using questions drawn from the established Flight Management Attitudes Questionnaire (FMAQ).[6] Questions from Hofstede's Values Survey Module (VSM)[10] were also used to further determine whether the pilots' values and behaviors on the flight deck correlate with socio-psychological measures of cultural dimensions.

METHODS

Subjects

The study protocol was approved in advance by the Coventry University ethics committee. Each subject provided written informed consent before participating. Participation was voluntary and confidential, and data were collected using anonymous questionnaires.

Added to the survey were demographic items which enabled the categorization of respondents into cultural groups. The determination of personal cultural identity was by self-categorization, with no relation to passport or parents' nationality, citizenship, ethnicity, nor geography. Western and Asian groups consisted of individuals who were born, bred, and had both parents from within their respective cultural backgrounds. TCKs, on the other hand, were defined following Pollock and van Reken's definition as "individuals who have spent a significant period of time away from their parents' culture during childhood."[15] The length of time spent away from the parents' culture was not explicitly defined in the survey, as it was considered that time by itself is not a determinant factor of third culture development and therefore it was left for the respondent to decide what was "significant."[15] Childhood was defined as up to age 18.[15] Also included in the TCK group were those who had attended an international school, and individuals who had parents of different cultures (may or may not be of the same race). In summary, respondents who identified with either one of the following groups were categorized as TCKs:

- Western parents but who spent a significant period of time in Asia during childhood (up to age 18);
- Asian parents but who spent a significant period of time in the West during childhood (up to age 18);
- Born to parents from at least two cultures. May or may not be of the same race;
- Have studied in an international school.

The survey was distributed via internal memo to a multicultural population of pilots employed by a large, international airline based in Hong Kong ($N = 3275$, 51 passport nationalities, 70% of its pilots do not consider Hong Kong "home": Internal information 2019). As it has been proven that a predominant, company culture typically exists among international airlines with pilots from various national backgrounds,[1] recruiting subjects employed by the same airline ensured that such organizational influences were controlled, so that differences detected by this study would be more reflective of fragments of national culture which remain even after an integration of cultures at the organizational level.

Survey

Data collection was by a 59-item survey with items imported from existing FMAQ and VSM questionnaires, measured on a five-point Likert scale. Items from the FMAQ (1996 international version, which included "culture-tapping items")[6] provided a measure of the respondents' work values and flight management attitudes. The FMAQ included items originally imported from the 1982 version of Hofstede's VSM and, as the VSM has since been updated in 2013, these items were updated prior to implementation. These VSM-based items (2013 version)[10] measured the pilots' cultural dimensions. The use of questions from these methodologies ensured that the results are based on recognized, established scales, and allows direct comparison with previous research using established geographic conceptualizations of culture. The compatibility of the FMAQ methodology with the modern, international pilot cohort has also been confirmed by recent studies. You et al.[21] validated the applicability of the FMAQ for assessing the safety culture of Chinese pilots in four of China's legacy airlines, and Seva et al.[16] successfully used a shortened successor to the FMAQ to evaluate CRM training among Filipino pilots.

Work values were addressed over 12 FMAQ derived questions representing preferences for Relations (importance of good relationships with superiors and coworkers), Rewards (high earnings and advancement), Independence (life away from work, sense of accomplishment), and Order (strict time limits, job with no surprises, the one solution).[6] As the focus was on finding cultural influences on desired work values, pilots participating in the survey were asked to imagine their

ideal job, as opposed to rating their current job, when completing these questions.

Flight management attitudes were assessed through composite scales of Command, Communications, Stress, Rules and Order, and Automation, also derived from the FMAQ.[6] A high score on the Command scale reflects a preference for autocratic command styles, with greater power distance between the Captain and crew, less communications initiated by junior crew, and greater unquestioned reliance on the Captain for the conduct of flight. The Communications scale represents belief in interpersonal communications. Pilots' attitudes toward stress were assessed in two subscales: the My Stress subscale, which addressed the pilots' self-evaluation of their own performance under stress; and the Others' Stress subscale with items related to the management of both their own stress when working as part of a team and also in relation to their teammates' stress levels. The Rules and Order scale concerns pilots' dependency and preference for set rules and procedures. Finally, the Automation scale reflects the pilots' preference for and their reliance on automation.

Items based on the VSM[10] assessed the pilots' values and behaviors on Hofstede's cultural dimensions. Hofstede and Minkov's[10] formulae were used to calculate IDV, PD, and UA scores. All three dimensions have been proven to replicate in the aviation environment.[6,8,13]

RESULTS

There were 106 responses received over a 9-mo period (April to December 2018), comprised of 47 (44%) from Westerners, 38 (36%) from TCKs, and 21 (20%) from Asians. The subsample sizes were sufficient for the comparison of "culturally influenced values and sentiments of similar respondents from two or more countries" as they exceeded Hofstede and Minkov's[10] suggested minimum sample size of 20 subjects per homogenous nation for ensuring that outlying answers by single respondents would not unduly affect the overall results. The TCK sample consisted of a diverse group of ethnically Western TCKs ($N = 13$), ethnically Asian TCKs ($N = 18$), and TCKs with parents from different cultures ($N = 7$). A higher percentage of the Western pilots surveyed (94%) previously flew for another airline before flying for the current airline, in comparison with TCKs (47%) and Asians (14%).

Responses were screened for individual item scores which exceeded 2.5 SD from the item mean ($P < 0.9875$). A total of 68 observation points were removed, representing 1.1% of the total responses. Items' polarities were also checked to ensure that higher scores represented a greater desire for work values, an inclination for autocratic command, stronger belief in crew communications, more realistic appraisal of performance under stress, greater preference for and reliance toward automation, and propensity toward following rules and order. Items were then combined into their respective scales (of Work Values, Command, Communications, etc.) to calculate scale-level scores.

Statistical analysis of the results involved the use of one-way analyses of variance (ANOVAs) at both the item and scale level (scales of work values, command, communications, etc.) to identify statistically significant cultural differences between Western, TCK, and Asian cultural groups. Where applicable, Tukey-Kramer post hoc tests were conducted to identify whether particular cultural pairs (Western-TCK; TCK-Asian; or Western-Asian) were responsible for any observed cultural differences.

Focusing on the items measuring work values, significant cultural differences between the three cultural groups were found in the Work Values subscales of Independence [$F(2313) = 12.39$, $P < 0.01$, $\eta 2 = 0.07$] and Order [$F(2421) = 3.67$, $P < 0.05$, $\eta 2 = 0.02$]. The Western and TCK groups had comparatively greater desire for independence from work and had a stronger preference for order, in comparison with the Asian group (**Table I**). Tukey-Kramer post hoc tests at the 0.05 level of significance revealed nonsignificant differences between Westerners and TCKs for the Independence subscale, but significant differences were found between Asians and both Westerner and TCK groups. Similarly, post hoc Tukey-Kramer tests of the Order subscale found no significant effects between Westerners and TCKs.

The pilots' flight management attitudes were assessed by FMAQ scales including attitudes toward Command, Communications, Stress, Rules and Order, and Automation, with results presented in **Table II**. With the exception of attitudes toward Communications, statistically significant cultural differences were observed on all measures of flight management attitudes.

Attitudes toward Command differed significantly between Western, TCK, and Asian groups [$F(2931) = 5.53$, $P < 0.01$, $\eta 2 = 0.01$], with Asian pilots having a higher score on this scale compared to their Western and TCK colleagues (Table II). The variations observed were once again caused by a split between the Western-TCK group (who preferred shallower command gradients) and their Asian colleagues (who had a relatively greater preference for hierarchical command). Post hoc Tukey-Kramer tests ($\alpha = 0.05$) showed nonsignificant Western-TCK differences, but TCK-Asian and Western-Asian pairwise comparisons confirmed that the Asian group had significantly higher scores on the command scale.

Pilots' attitudes toward their performance under stress were assessed across the two stress subscales of My Stress (assessment of own performance under stress), and Others' Stress (assessment of own and team performance when others are stressed). Overall, across both subscales, the composite means

Table I. Work Values Scores by Cultural Group.

WORK VALUES SCALES	SCORES BY CULTURAL GROUP					
	WESTERN		TCK		ASIAN	
	MEAN	SD	MEAN	SD	MEAN	SD
Relations	3.82	0.88	3.79	0.92	3.75	0.78
Rewards	4.07	0.77	4.16	0.69	4.29	0.67
Independence	4.50	0.63	4.46	0.72	3.97	0.93
Order	3.02	1.03	2.92	1.06	3.30	0.99

Table II. Flight Management Attitude Scores by Cultural Group.

FLIGHT MANAGEMENT ATTITUDE SCALE	SCORES BY CULTURAL GROUP					
	WESTERN		TCK		ASIAN	
	MEAN	SD	MEAN	SD	MEAN	SD
Command	1.79	1.09	1.85	1.06	2.11	1.22
Communications	4.27	0.92	4.32	0.92	4.00	0.91
Stress						
My Stress	3.59	1.15	3.59	1.10	3.22	1.04
Others' Stress	3.79	1.12	3.75	1.09	3.61	1.14
Rules & Order	2.78	1.10	2.73	1.08	3.20	1.00
Automation						
Preference	2.82	1.26	3.13	1.20	3.29	1.29
Reliance	3.28	1.36	3.33	1.31	3.25	1.36

of all three cultural groups concurrently fell within the range of 3.22 to 3.79 (on a five-point scale; Table II), indicating generally positive attitudes to stress evaluation and stress management. Significant differences were detected on the My Stress subscale [$F(2628) = 5.46$, $P < 0.01$, $\eta 2 = 0.017$] with Western and TCK pilots being more pragmatic, and Asian pilots being relatively more idealistic in their assessment of their own performance under stress (Table II). Further de-composing the ANOVA results by post hoc Tukey-Kramer testing ($\alpha = 0.05$) found nonsignificant differences between Westerners and TCKs, but significant differences between TCKs and Asians as well as between Westerners and Asians. In contrast, cultural differences were nonsignificant on the Others' Stress subscale.

The attitudes toward the Rules and Order scale similarly produced results suggesting a split between the Western-TCK group and Asians. While overall tripartite cultural differences were statistically significant [$F(2527) = 7.213$, $P < 0.01$], post hoc Tukey-Kramer testing ($\alpha = 0.05$) revealed that Westerners and TCKs were not significantly different, but significant differences were found in the TCK-Asian and Western-Asian comparisons. Specifically, cultural differences crossed the neutral midpoint, with Western and TCK pilots having slightly negative attitudes to rules and procedures, and Asian pilots in slight agreement (Table II).

Pilots' attitudes toward automation were measured over 14 FMAQ items, with 4 items forming a preference for Automation subscale and 3 items forming a subscale reflective of their reliance on automation. The seven remaining items were not assigned to either of these subscales. These seven items were related to automation usage, but did not reflect either preference or reliance attitudes. An example is the item "my company expects me to always use automation," which is obviously related to automation, but as it had no relationship to preference or reliance attitudes it was not included in the respective subscales.

Survey results showed statistically significant cultural differences in Automation preference [$F(2417) = 5.04$, $P < 0.01$], with Asian pilots having greater preference for automation followed by their TCK and lastly Western colleagues (Table II). Post hoc Tukey-Kramer tests at the 0.05 level found nonsignificant differences between TCKs and both Westerners and Asians, whereas Westerners had significantly lower scores than TCKs and Asians. On the other hand, no differences were detected on the Reliance subscale.

The item "my company expects me to always use automation," which was not assigned to either the automation Preference or Reliance subscales, was particularly intriguing as the survey was distributed to pilots employed by the same company and hence the company's expectation should be the same. The variations for this item, therefore, are most indicative of innate differences in the self-perception of what pilots think the company wants them to do. Statistically, this item had the widest range (1.02) of all 59 survey items, with the item mean for Asians being highest at 4.30 (SD = 0.66), followed by TCKs at 3.53 (SD = 1.18) and Westerners at 3.28 (SD = 1.31). These means differed significantly [$F(2102) = 5.42$, $P < 0.01$], suggesting a high probability that cultural differences existed.

Cultural dimension scores were calculated for each group using Hofstede, Hofstede and Minkov's[10] formulae. These are presented in **Table III**. The IDV dimension displayed the Western-TCK and Asian split, with Western and TCK pilots being similarly individualistic, whereas for the PD and UA dimensions, TCKs were in the middle between Western and Asian pilots.

DISCUSSION

The results of this study suggest that TCK aviators function as a Western-leaning group with unique cultural characteristics. Of the work values, flight management attitudes, and cultural dimension scales measured, TCKs either behaved similarly to Westerners, had more extreme scores than Westerners on the East-West spectrum, or scored halfway between Western and Asian groups. They were not similar to Asians on any measure and never eclipsed Asians on the Eastern side of the East-West continuum. Such disparity proves that TCKs, while most similar to Westerners, are neither fully assimilated into either Western or Asian cultures, nor can they be considered culturally as "middle of the pack" between Western and Asian groups as may be expected of their "East meets West" backgrounds.

TCKs formed a similar cultural cluster with Westerners on the scales of Work Values, Attitudes Toward Command, My Stress, and Rules and Order (Tables I and II). The finding that TCKs were culturally Western-leaning was unlikely to be due to differences in TCKs' home-host country combinations as the sample consisted of a diverse group of ethnically Western, ethnically Asian, and mixed parental culture TCKs. In any case, even with consideration of the slightly larger sample of

Table III. Cultural Dimension Scores by Cultural Group.

CULTURAL DIMENSION	SCORES BY CULTURAL GROUP		
	WESTERN	TCK	ASIAN
Individualism-Collectivism (IDV)	66.6	66.3	22.7
Power Distance (PD)	62.6	48.5	26.3
Uncertainty Avoidance (UA)	33.6	43.5	53.4

ethnically Asian TCKs in this study, the data should theoretically present an Asian skew, which was not the case. Since the home-host country combination was not the source of the TCK group's Western-like characteristics, the findings are likely reflective of the fact that TCKs are more likely to adopt Western values and attitudes through an education in schools using Western curricula.[4]

For flight management attitudes (Table II), Westerners and TCKs similarly preferred shallower command gradients (lower Command scale score), had similarly pragmatic assessments of one's own performance under stress (higher My Stress score), and in general have lower dependency and less preference for set rules and procedures (lower Rules and Order score). Following Engle's[3] classifications, the TCK culture would, similar to Westerners, be classified as "low context". The finding of a preference for shallower command gradients (characteristic of high IDV cultures) in conjunction with the low Rules and Order scores is also congruent with the results of Merritt's[13] study which found that countries with individualistic cultures tend to indicate less preference for rules and procedures. That being said, it is imperative to understand that while the comparison between the Western-TCK cluster and Asian groups may give the impression that Asian pilots favored autocratic command styles and were reluctant to acknowledge their own limitations under stress, in reality it is the opposite. On the Command scale, the scores for all three cultural groups were unanimously below midpoint (3, neutral; Table II), indicating general, universal disagreement with autocratic command styles. This supports Wang and Wu's[20] observation that among highly competent crews with complementary skill sets, leader dominance is generally weakened.

Similarly, all three cultural groups had scores above midpoint for the My Stress scale (see Table II), suggesting generally realistic attitudes in self-assessment of stress. An exception to this pattern was found in the Rules and Order scale which presented cultural differences crossing the neutral midpoint (Table II). The finding of Asian pilots' positive attitudes and Western pilots' negative attitudes toward rules and procedures have been observed in previous research.[3] A possible explanation for TCKs' Western-like slightly negative attitude on this scale is that they adopt Western values from educational exposure.[4] Another possible reason is that as TCKs inherently lack a sense of belonging in relation to others, they develop greater loathing toward following rigid rules and procedures set by others.[4,15]

Congruent with TCKs' "East meets West" identities, TCK scores fell in the middle between Western and Asian scores on a number of scales. This was the case in the Automation Preference scale, and in the cultural dimensions of Power Distance (PD) and Uncertainty Avoidance (UA). Previous findings of TCKs' Western-leaning inclinations have proved that it is oversimplistic to assume that the TCK pilots' "middle of the pack" score on these measures are simply because TCKs are themselves transculturally "East meets West." The TCKs sampled in this study ranked in-between Westerners and Asians for automation preference (Table II) but were similar to Westerners being high in the individualism (IDV) dimension (Table III). This finding did not fully correspond with Helmreich and Merritt's[6] research which found that pilots' preference for automation can be predicted by IDV (individualistic pilots dislike automation as it robs them of autonomy). If Helmreich and Merritt's[6] findings were applicable to this study's subjects, then the TCK pilots sampled should, in theory, have Western or close-to-Western Automation Preference scores, but this was not the case. This mismatch between IDV and automation preference in this study can possibly be due to a variation in methodology. In Helmreich and Merritt's[6] study, they collected data from 36 airlines in 23 countries, and made an assumption that the resultant differences must have been solely due to differences in national culture between the 23 countries. It is entirely possible that the variations may in fact have been due to organizational differences between the 36 airlines. Their study also consisted of pilots operating 13 different types of aircraft: it is also possible that, for example, pilots operating aircraft with less capable automation features, regardless of national culture, will have less preference for automation. The argument here, therefore, is that with a more homogenous sample of pilots participating in this study (pilots in the same airline, operating similar aircraft), this study's findings were more truly reflective of differences in national culture as training, organizational, and professional differences were better controlled. By similar logic, another possible reason is that automation preference may in fact be determined more so by organizational culture, rather than individual pilots' IDV levels. Dahlstrom and Heemstra[1] conducted observations in a similarly multicultural airline and found that in such multicultural environments where there is no single, dominant national culture, the amount of time spent and exposure within a predominant organizational culture may have controlling influence over certain attitudes.

The PD dimension also had interesting results. Western pilots surveyed had the highest PD, followed by TCKs, then Asians (Table III). This rank order was surprising as it was completely the reverse of existing research which for the most part presents Asian societies as having higher PD than Western cultural groups.[3,6,11] This finding, however, is congruent with Merritt's[13] research which found pilots' PD scores to be less nationally-varied than those found in Hofstede's original sample, as a consequence of the pilot profession's seniority and command-driven occupational context. A closer inspection of previous research also offers additional possible clues to the Asian subjects' lower PD score. Helmreich and Merritt[6] found that Filipino pilots were able to overcome their culturally high PD by structuring their flight decks in an environment where Captains are seen as a father figure in a family "in-group" rather than as a hierarchically superior commander. In the airline surveyed, new pilots who join without previous experience will necessarily have to spend time in the airline's ab-initio training program, thereby becoming an "in-group" of "schoolmates" with their colleagues. Closer inspection of the survey results shows that a higher percentage of pilots of Asian backgrounds joined the airline with no previous experience, and hence had to go through the airline's ab-initio training. Asian pilots' low PD scores in the

findings of this study, therefore, were possibly due to greater influence from "in-group" membership.

While the results of this study suggest that TCKs do differ from both Western and Asian groups on certain values and attitudes, this study has potential limitations arising from its survey-based methodology. Firstly, Likert-scale based ratings may suffer from cultural response bias. For example, Asian respondents with a cultural norm of modesty are more likely to overuse the midrange of the scale.[6] Secondly, the voluntary nature of data collection means that the results may be influenced by participation bias, which in this cross-cultural study with data collected in an international environment may reflect a higher participation by individuals with high context, collectivistic (i.e., Asian) tendencies. There may also be a cultural variation in the degree of trust given to the assurance of confidentiality of survey responses, which may contrarily discourage participation by Asian-inclined pilots who would have a cultural tendency to not like to bring attention to oneself.[6] The requirement for confidentiality also means that there were no protections as to who completed the survey. That being said, as the population of pilots in the airline surveyed are all experienced in Likert-scale ratings by process of their training system, and that the survey link was sent digitally to each pilots' personal email addresses, the effects of these limitations were unlikely to be of significant impact. It is also appropriate to note here that while the results do present dissimilarities between the TCK group and their Asian colleagues, a limitation of the data collected in this study is that there was no differentiation between various Asian subcultures (e.g., East Asian, South Asian, etc.).

By presenting a profile of the 'TCK pilot' using well-established measures of flight management attitudes and Hofstede's cultural dimensions, the results of this study add to previous research by highlighting the strengths, weaknesses, and characteristics of TCK pilots, which may contribute to changes and improvements in human factors applications. In summary, it was found that TCKs are in many ways similar to Westerners, being almost as individualistic (high IDV), displaying similar work values preferences (giving high importance to independence from work), attitudes toward command (preferring shallower command gradients), self-evaluation of their own performance under stress (relatively more pessimistic), and slightly negative attitudes toward rules and procedures. There were no differences between Western, TCK, and Asian cultural groups for automation reliance, and pilots of all cultures universally disfavored autocratic command styles. The results also showed TCK pilots to be in-between Western and Asian groups in the cultural dimensions of PD and UA.

Considering the TCK pilot population as a Western-like group with unique cultural characteristics enables positive improvements to be made in CRM training, airline management, as well as training design. The results indicate that national culture differences in values and attitudes can still be detected over and above the professional and organizational culture,[1,13] highlighting weaknesses in current CRM training in bringing pilots of varying cultural backgrounds toward a common, culturally blind, organizational ideal standard. For the TCK group, tailored CRM training focusing on team building and rule following will help overcome their inherent high individualism and negative attitudes toward rules and order. For airline management, the finding that TCKs share the same work values as Westerners means that when managing job morale or labor disputes with TCKs, it is best to consider them as a 'Western' group with Western desires and values (even though TCKs may hold Asian passports and thus may appear as Asian on personnel management systems). Training design and delivery can also be adapted in response to the findings of this study. People of Western cultures work harder on a task if told they are successful, whereas Asians work harder if told they have failed.[14] The finding of TCKs' Western inclination means a 'Western' approach will be more suitable when training TCKs. Training program designs placing more resources on easily amenable traits (e.g., automation reliance) and fewer resources on strongly culturally rooted behaviors (e.g., automation preference) can also improve training efficiency by ensuring that training concepts are in harmony with cultural attitudes and that limited resources are allocated where the potential for change is the greatest.[8,17] Nevertheless, there remains a need for further research. For example, examining the impacts of multiculturalism on pilots' information processing and decision making strategies may inform more technically focused changes. Investigating cultural spectrums other than the East-West one, in conjunction with observing cross-cultural behaviors in, for example, pilots who have had pilot training in foreign countries before the age of 18, will also provide a clearer definition of the TCK culture in the pilot occupation.

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