

Learning Activity Engagement Variations Between Geo-Cultural Contexts

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Abstract

Openness and reachability embedded in the MOOC learning environments implies diversity and inclusiveness. Researchers have recently started exploring international participation and progression in MOOCs. Despite the importance of cultural constructs and pedagogical factors in learning, there remains a paucity of empirical evidence on cultural influences on MOOC learning. This exploratory study, therefore, assessed the participation pattern of ten geo-cultural contexts in a MOOC learning design. The study leveraged data of 2086 learners from 67 countries, enrolled in a FutureLearn science MOOC. Using the measures of relative frequency of access, we were able to infer that cultural contexts participation varied between different learning activity types as we noticed a dissimilar interest of geo-cultural contexts in different types of activities. The findings from this study raised intriguing questions regarding the nature and extent of participation of various geo-cultural contexts, eventually leading to the potential development of a MOOC design that adapts to the cultural needs of prospective learners.

INTRODUCTION

The relevant literature repeatedly points to various regional and geo-cultural factors that may influence the way learners engage with Massive Open Online Courses (MOOCs) [1, 2, 3, 4]. MOOC learning environments have long received substantial criticism for large enrolments yet low engagement [1]. The research has often examined learners' engagement with various learning design elements, for example, reading material [5, 6], instructional videos [7, 8], quizzes and other assessments [9, 10], and participation in course discussions [11, 12, 13]. Since learning activities may be the key elements that influence the effectiveness of a course design, it is essential to understand variations in learners' engagement with various types of activities. This research conceptualises course learning design (LD) as the course development process where the designers create a series of learner-facing activities containing different types of learning materials (e.g., reading activities or articles, learning material consisting of audio or video content) [14, 15]. Furthermore, several contextual characteristics and regional and cultural indicators have long supported researchers to understand MOOC learners' engagement.

Against this background, this research aims to understand learners' experiences by examining their engagement with various learning design elements in open online learning environment. The study further explores the differences in activity engagement patterns across various geo-cultural contexts and attempts to answer the following research question.

RQ: How and to what extent does engagement with different learning design elements differ between the geo-cultural contexts?

METHODOLOGY

Context and Data Pre-processing

The data was collected from a large and diverse science MOOC developed by the OU and offered via FutureLearn in the year 2017. The course run enrolled a total of 2086 learners from 67 countries worldwide. The four weeks long course contained 68 learning activities. For the purpose of analysis, the following information was extracted from the course log files: anonymised learners ID, week number, learning activity-type, learning activity. Following the data retrieval, OULDI framework [16] was employed to map the specific activities to general learning design features.

FutureLearn MOOC designs offer a unique feature which allows learners to mark a specific learning activity as complete when they (think that they) have understood the content. Given that this research

is situated in the FutureLearn environment, it is noteworthy that FutureLearn's policy on "certificate of participation" may vary slightly between the courses. However, to attain a certificate of participation in most courses, a learner must mark at least 50% of the course steps as complete. An initial analysis of log data used in this research pointed towards three distinct clicking patterns [14], potentially representing three unique dispositions: Markers (i.e., those who marked all their activities as completed); Partial-Markers (i.e., those who marked few of the activities they assessed), and Non-Marker (i.e., those who never marked any of their activities as completed) [14]. This categorisation closely followed the methods suggested in previous literature (Ferguson & Clow, 2015; Kizilcec et al., 2013). Based on how learners have marked activities as complete, the study sample was grouped into 449 Markers, 832 Partial-Markers, and 805 Non-Markers.

For the geo-cultural categorization of learners enrolled in the course, the study utilised GLOBE theoretical framework [19]. IP based locations were used to identify the locations. Learners' locations were categorized into following ten geo-cultural groups; Sub-Saharan Africa (AF), Anglo-Saxon (AS), Confucian Asia (CA), Eastern Europe (EE), Germanic Europe (GE), Latin America (LA), Latin Europe (LE), Middle East (ME), Nordic Europe (NE), and Southern Asia (SA). Figure 1 illustrates the distribution of learners in ten geo-cultural groups and also provides a breakdown of the number of learners from each of the three clickstream groups (M, PM, and NM). Data points were removed where location was unavailable (n = 60).

Data Analysis Method

Descriptive statistics and the Kruskal Wallis test were used to measure contextual differences in activity access behaviour. Kruskal-Wallis is a non-parametric test for samples of three or more groups, where the groups are mutually exclusive and independent. The test followed a post-hoc pairwise Wilcoxon rank sum test, which performed comparisons between the ten geo-cultural contexts. Non-parametric tests were opted as the primary analysis methods because the engagement measurement (frequency of access) was not normally distributed overall or in any of the contexts. The follow-up test further examined the significance of differences between various pairs of subgroups. For each of the activity types (article, video, discussion and quiz), the activity engagement differences were first explored in the overall learners' sample, and then separately in all three subgroups of learners (M, PM, and NM) from ten geo-cultural clusters.

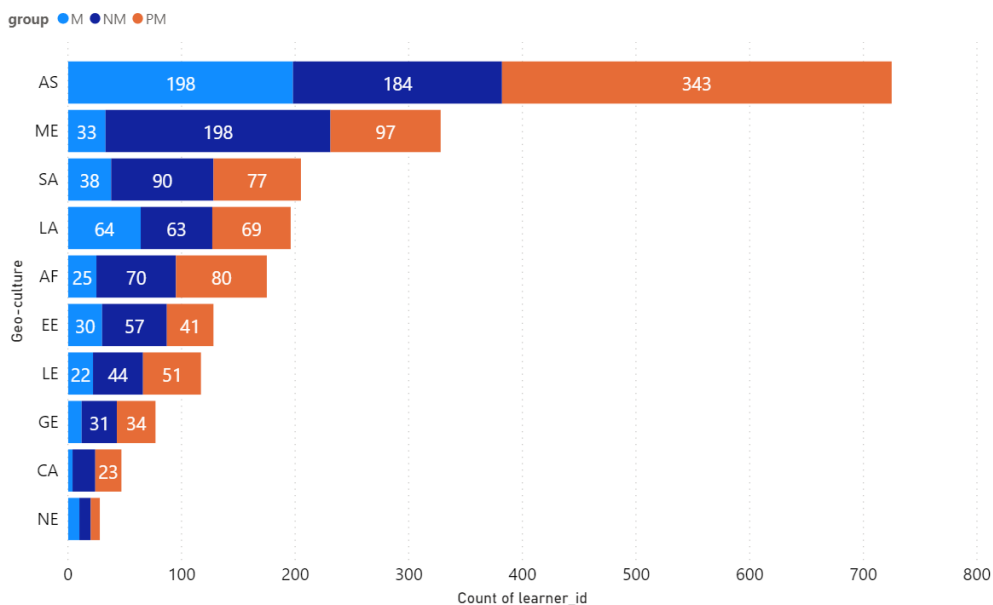


Figure 1. Distribution of each group of learners (Markers, Non-Markers and Partial Markers) across ten geo-cultural clusters.

RESULTS AND DISCUSSION

The research question examined whether the variations in learning activity engagement differed between geo-cultural contexts. What stands out in the results is that some geo-cultural groups exhibited activities not aligned with their distribution in the sample. For example, in this science MOOC, the Latin American subgroup comprised more than 14.4% of the overall Markers' population, but the group was found accountable for more than 17.4% of accessed activities for Markers. On the other hand, South Asian and Middle Eastern cluster comprised over 8.8% and 7.7% of the Markers group, respectively, but each remained responsible for just over 6% of overall Markers' happenings. Figure 2 shows the distribution of activity engagement across ten cultural clusters, first for the entire data and then for each group of Markers, Partial and Non-Markers. The group of Markers tended to remain aligned with the course activity distribution, signifying minimal cross-cultural differences in activity access frequencies. Still, a closer inspection of activity engagement duration suggested otherwise. Within Markers, the second largest and second most active geo-cultural group (Latin America) exhibited the smallest median activity duration (median 1 minute 27 sec per session before they marked the activity as completed). In contrast, in other small, less frequent groups of learners (like from Germanic and Latin Europe), the median activity engagement duration remained just more than 3 minutes per session. In other words, accessing more resources did not guarantee that a geo-cultural group will also spend more time with the accessed resource.



Figure 2. An aggregated view of the differences in geo-cultural contexts in terms of the proportion of relative frequency of access for all four types of learning activities (Article, Video, Discussion, Quiz). In clockwise order: (i) Overall behavior; (ii) Markers; (iii) Non-Markers; (iv) Partial-Markers.

Partial-Markers group appeared to follow the access and engagement-duration patterns of Markers. However, a distinct activity engagement behaviour was noticed within Non-Markers. Within all geo-cultural clusters in Non-Markers, there was an overall increase in assimilative activity access frequency, particularly in video-based activities. Disregarding the small sample of Nordic European Non-Markers ($n = 10$), the behaviour was most prominent in Latin American and Middle Eastern learners. For these two slightly large geo-cultural clusters, the video-access frequency remained 61.5% and 55.7% of total activities accessed, whereby the course design contained 11.7% videos.

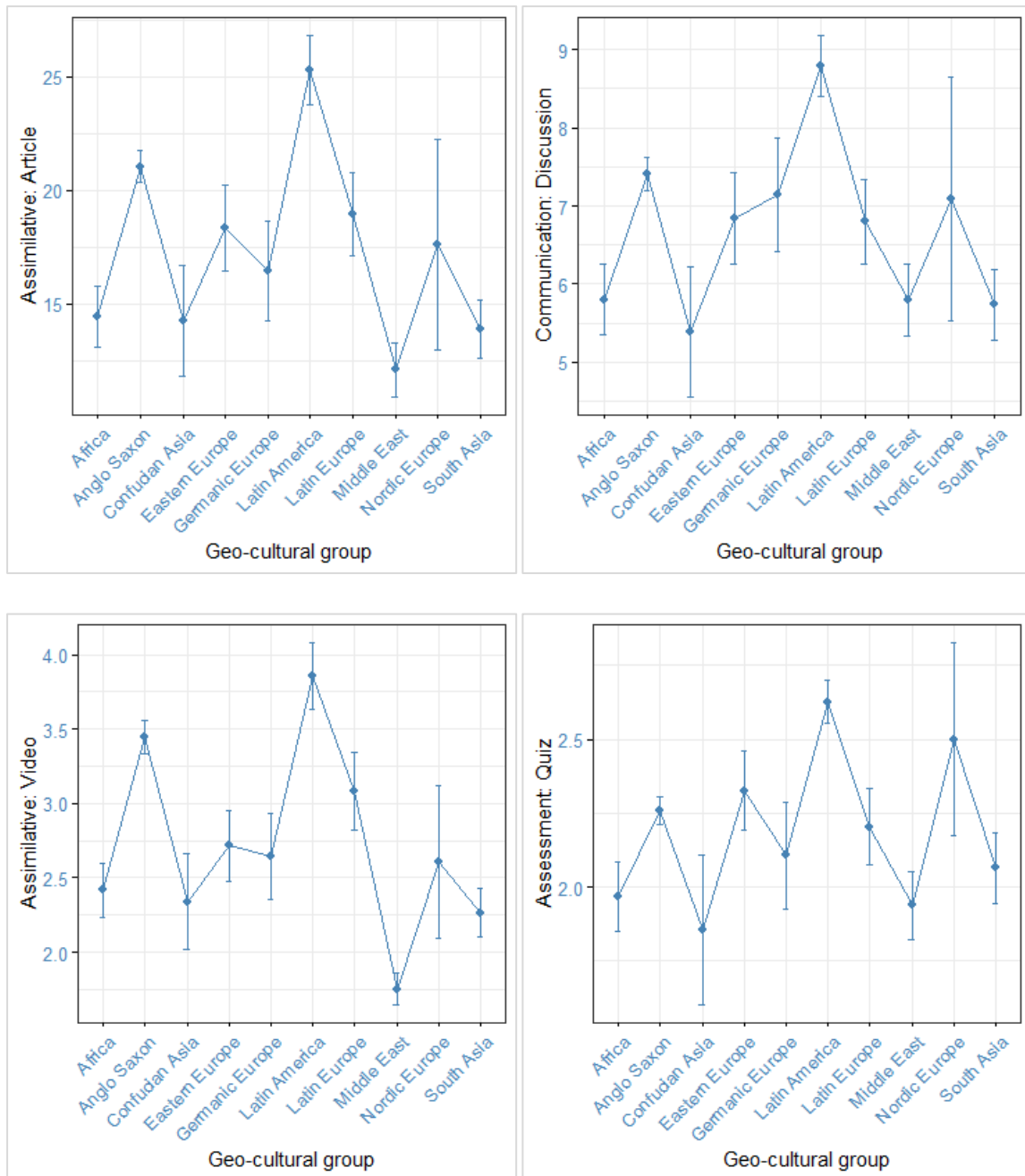


Figure 3. Geo-cultural differences in mean frequency of access for four types of learning activities. In clockwise order: (i) Article access; (ii) Discussion access; (iii) Quiz access; (iv) Video access. Error bars represent 1 SE.

Figure 3 illustrates the differences between the ten geo-cultural clusters in the average ways they accessed each activity type. Figure A1 to Figure A4 in Appendix A show these differences for each of the subgroup of Markers, Partial-Markers and Non-Markers. Few geo-cultural contexts showed a consistently more active behaviour (for example, Anglo-Saxon or Latin American contexts). As illustrated in Figure 3, few other geo-cultural contexts were slightly less engaged (like African, Middle

Eastern, and South Asian learners), where the access frequency fell to the lowest points. Comparing the accessed activities, the extent of disengagement for these less-interested group was particularly distinct in reading and discussion-based activities (i.e., in articles and discussions).

Next, the statistical significance of variation was evaluated for the median activity engagement. Across the geo-cultural contexts, statistically significant differences were found ($\alpha = 0.05$) in all four types of activities (see Table 1 for the median activity access). A pairwise comparison (at $\alpha = 0.05$) found that for one activity type or the other, there were differences (all $p < 0.001$) in all pairs except the smallest group of Nordic European learners ($n = 28$), which remained empirically unnoticeable.

Table 1. Results from the Kruskal-Wallis tests for the activity access behaviour metrics, illustrating activity access differences in geo-cultural contexts. Statistically significant values are in bold. Median activity access is also listed.

Measurement metric	Geo-cultural Contexts										H (df)	P
	AF	AS	CA	EE	GE	LA	LE	ME	NE	SA		
Article access	9	14	9	9	9	33	10	5	6	8	76.9 (9)	< 0.001
Video access	1	2	1	1	1	2	2	1	1	1	135.6 (9)	< 0.001
Discussion access	3	8	3	7	7	12	7	3	9	3	47.8 (9)	< 0.001
Quiz access	2	3	2	3	3	3	3	2	3	2	37.2 (9)	< 0.001

In all three groups of Markers, Partial and Non-Markers, distinct patterns of activity access were found across the geo-cultural contexts (See Figure A1 to Figure A4). Nevertheless, during the pairwise difference analysis, the three smallest subgroups (i.e., Confucian Asia ($n = 47$), Nordic Europe ($n = 28$), and Germanic Europe ($n = 77$)) never surfaced in any of the pairwise differences. Table A1 in Appendix A reports the test results for each of the three groups and the median activity access for all ten geo-cultural contexts.

In terms of article access behaviour, no geo-cultural differences were observed in Markers ($H(9) = 14.62, p = 0.10$) or Non-Markers ($H(9) = 10.53, p = 0.31$). However, among the Partial-Markers, several differences were noticed ($H(9) = 34.85, p < 0.001$). The most unique article access behavioural differences were found between the pairs of Middle Eastern ($Mdn = 6$) versus Anglo-Saxon ($Mdn = 10$) learners and Middle Eastern versus Latin-American learners ($Mdn = 13$). In this MOOC, the video access behaviour across the cultural clusters remained disparate, consistently in all three groups of Markers. Among Markers, the pairs of South Asian ($Mdn = 3$) and Anglo-Saxon ($Mdn = 8$) were found to be most distinct ($p < 0.001$). Moreover, within Partial Markers, video access behaviour was

dissimilar in the pairs of Middle Eastern ($Mdn = 1$) and Anglo-Saxon ($Mdn = 2$) and Middle Eastern and Latin American ($Mdn = 3$) learners. All in all, for assimilative activities, two distinct patterns of engagement were noticed across the geo-cultural groups, with Anglo-Saxon and Latin American learners on one side (more engaged) and South Asian and Middle Eastern learners on the other side (less engaged).

The way learners accessed discussion-based activities also varied across cultural contexts, particularly in the groups of Markers and Partial-Markers. For example, for the former, the pairwise difference was prominent ($p = 0.01$) between pairs of Latin American ($Mdn = 12$) versus African ($Mdn = 10$) learners. The quiz access behaviour was different across the geo-cultural context but unsurprisingly, only for the learners who Marked all activities as completed ($H(9) = 23.14, p < 0.001$). The pairwise analysis suggested the quiz access difference was significant ($p = 0.034$ in both) between Latin American versus African and Latin American versus South Asian learners (however, all $Mdn = 3$). Overall, it was found that assimilative and communication activity engagement behaviours varied between geo-cultural clusters, mainly among Partial Markers and Non-Markers. However, the median differences in this science MOOC were most prominent in the way learners accessed articles and discussions.

The overall findings suggest that academics and course designers should give more thought to designing communication and assessment activities for MOOC learning environments to make such activities more appealing to informal learners residing in various regions across the globe. Taken together, the evidence seems to indicate that the proportion of various learning activity types in a MOOC can have a significant impact on the engagement of diverse learners. These findings, while preliminary, may help us to understand the nature and extent of participation of various geo-cultural contexts in disparate learning activities. The findings raise intriguing questions regarding the nature and extent of participation of various geo-cultural clusters in distinct learning designs, eventually leading to the potential development of a MOOC design that adapts to the cultural needs of prospective learners.

Appendix A

Table A1

	Metric: Activity access behaviour	AF	AS	CA	EE	GE	LA	LE	ME	NE	SA	Chi- Square	Df	P
Overall		9	14	9	9	9	33	10	5	6	8	76.97	9	6.43E-13
	Video	1	2	1	1	1	2	2	1	1	1	135.62	9	<2.2e-16
	Discussion	3	8	3	7	7	12	7	3	9	3	47.8	9	2.79E-07
	Quiz	2	3	2	3	3	3	3	2	3	2	37.25	9	2.38E-05
M	Article	38	44	44	44	44	44	44	44	44	28	14.62	9	0.1
	Video	5	8	8	8	6	8	8	4	7	3	18.88	9	0.02
	Discussion	11	12	12	12	12	12	12	12	12	12	22.04	9	0.009
	Quiz	3	3	3	3	3	3	3	3	3	3	23.14	9	0.006
PM	Article	9	10	7	9	8	13	10	6	4	7	34.85	9	6.34E-05
	Video	2	2	2	2	2	3	3	1	2	1	21.31	9	0.01
	Discussion	3	4	3	3	4	7	4	3	2	3	22.38	9	0.008
	Quiz	2	2	1	2	2	3	2	1	1	2	13.87	9	0.127
NM	Article	2	1	7	2	3	1	2	1	1	2	10.53	9	0.31
	Video	1	1	1	1	1	1	1	1	1	1	23.11	9	0.006
	Discussion	2	1	7	2	8	1	1	2	0	3	12.13	8	0.146
	Quiz	2	1	1	1	1	0	1	1	0	1	1.81	7	0.97

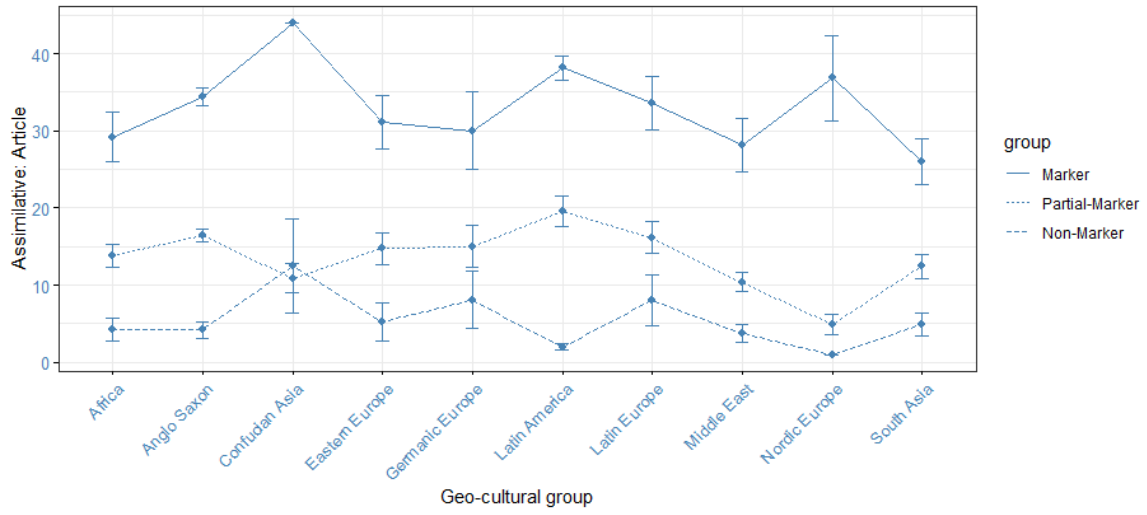


Figure A1

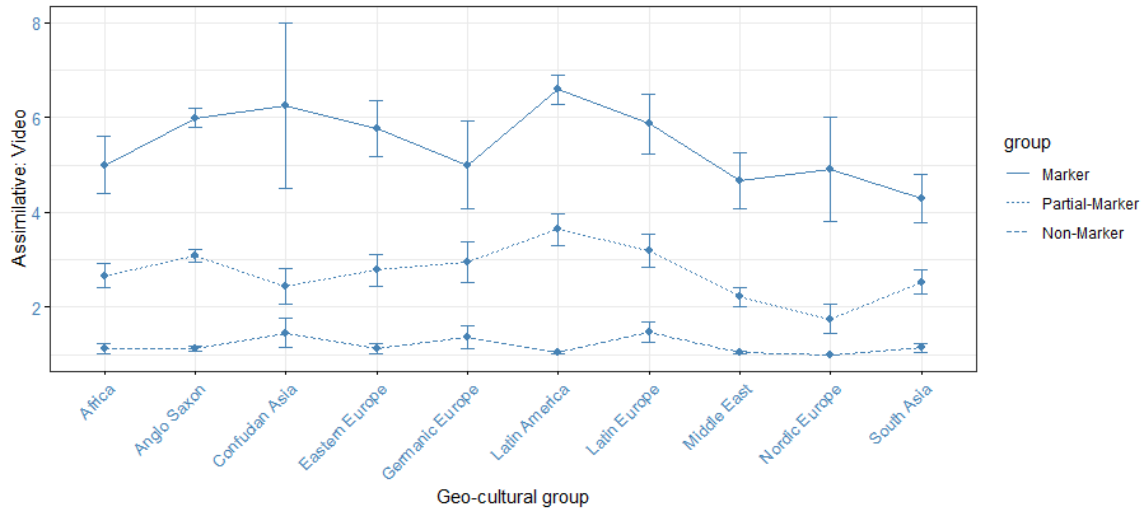


Figure A2

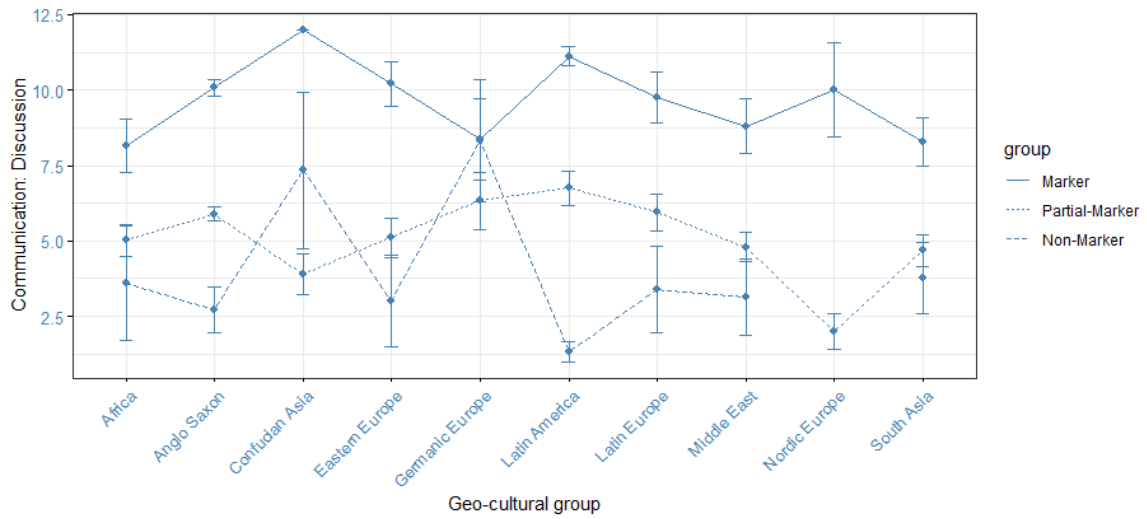


Figure A3

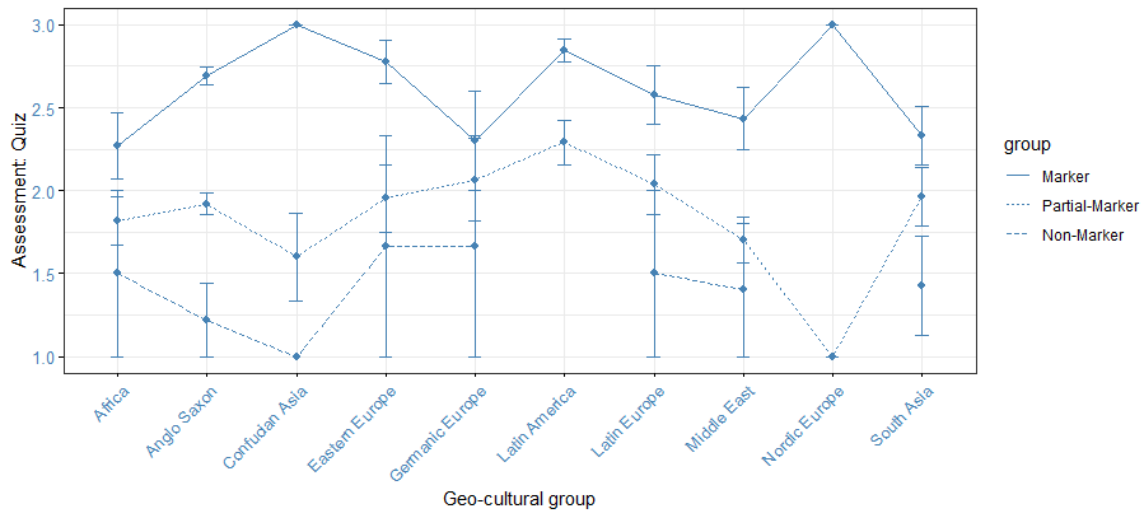


Figure A4

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