The Susceptibility of Africans to Persuasive Strategies: A Case Study of Nigeria

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Abstract. Persuasive technology has become popular in recent years as an effective tool for changing behavior. However, research on the African population is scarce. Consequently, we conducted a study among 88 participants to determine their persuasion profile using Nigeria as a case study. Specifically, we investigated their level of susceptibility to Cialdini's persuasive strategies—Authority, Commitment, Consensus, Liking, Reciprocity and Scarcity—which are currently being applied in persuasive technology design. Moreover, we investigated how gender moderates the responsiveness of Nigerians to these strategies. The results of our analysis showed that Nigerians are susceptible to all six strategies, with Commitment, Reciprocity, Authority and Liking being the most persuasive strategies, and Consensus and Scarcity being the least persuasive strategies. Moreover, males are more susceptible to Commitment and Authority than females. Finally, we compared our finding with that of a similar study in the literature. Our main contribution to knowledge is the uncovering of the persuasion profile of Nigerians with respect to Cialdini's persuasive strategies. Hitherto, this demographic has been understudied in persuasive technology research.

Keywords: Persuasive Technology, Persuasive Strategies, Personalization, Cialdini, Susceptibility, Nigeria, Gender Difference, Rating, Ranking, Culture.

1   Introduction

Persuasive technologies are interactive systems that are intentionally designed to bring about behavior change through system-based or social influence. In recent years, the use of persuasive technologies have gained traction in many fields of human endeavors, e.g., health, commerce, etc. However, research [1, 2] has shown that persuasive technologies will be more effective in changing behavior if they are personalized to users.

However, in persuasive technology research, there are limited studies that have investigated the influence of culture on the susceptibility of individuals to persuasive strategies [3]. More specifically, the African continent has been practically left behind in human-computer interaction (HCI) research in general, despite the fact that it is one of the fastest growing mobile markets worldwide [4]. Most prior research efforts have been focused on the Western/Asian demographics [5]. For example, in Orji and Moffatt's [6] systematic review of persuasive technologies, 38% of the 85 studies reviewed were conducted in the United States, 19% in the Netherlands, 6% in Taiwan, and 5% each in Finland and Japan. None of the reviewed studies was conducted in

Africa. This exemplifies the dearth of knowledge on the African population in persuasive technology research. To advance research in this area, we investigated the level of responsiveness of Nigerians to Cialdini's six persuasive strategies: Authority, Commitment, Consensus, Liking, Reciprocity and Scarcity. We chose Nigeria as a case study because it is the most populous country in Africa and has the largest number of Internet users in Africa as well [7].

We conducted an online survey to determine the persuasion profile of Nigerians with respect to Cialdini's principles of persuasion and the moderating effect of gender. The results of our analysis show that Nigerians are responsive to all of the six persuasive strategies. They are most susceptible to Commitment, followed by Reciprocity, Authority and Liking. On the other hand, they are least susceptible to Consensus, followed by Scarcity. Moreover, our results reveal that there are gender differences, with male being more responsive to Commitment and Authority than females. Finally, we compared the result of our study with that of a similar study in the extant literature to uncover the similarities and differences in persuasion profiles with respect to Cialdini's persuasive strategies.

The rest of this paper is organized as follows. Section 2 focuses on background and related work. Section 3 focuses on methodology. Section 4 focuses on the result. Section 5 focuses on the discussion. Finally, Section 6 focuses on the conclusion.

2   Background and Related Work

This section provides a background and a review of related work on Cialdini's persuasive strategies.

2.1   Cialdini's Persuasive Strategies

Cialdini's [8] persuasive strategies are known as universal principles of influence. They are six in number and are widely applied in persuasive technology research [2] just as in marketing and advertising [9].

Authority. The Authority principle of persuasion holds that people are more likely to listen and obey those in positions of authority than those who are not [8]. This means that they are more likely to follow the lead of authority figures whom they consider knowledgeable and credible experts in their fields, even though this may not be true. In the context of persuasive technology, this means users are more likely to use a system if they consider the designers of the system or the featured change agents as credible.

Commitment. The Commitment principle holds that people are more likely to take a certain course of action if they commit to it verbally or in a written form [8]. Specifically, people tend to keep their commitment and promises in order to maintain and preserve their self-image, even when the original motivation for performing such an action is removed. In the context of persuasive technology, this means a user is more likely to perform a given behavior if s/he commits to doing it, e.g., by setting goals.

Consensus. The Consensus principle holds that people tend to look up to others around them prior to taking a certain course of action they are uncertain about [8]. In the context of persuasive technology, it is referred to as Social Learning [10]. In other words,

a user is more likely to perform a given behavior if s/he can observe others performing the behavior or has seen the action and/or outcome of the behavior.

Liking. The Liking principle holds that that people are more likely to grant the request of those they like than those they do not like [8]. In other words, people are more likely to perform a behavior if the request to engage in the behavior is coming from someone or a system they like or find attractive.

Reciprocity. The Reciprocity principle holds that people are more likely to do a favor to others if they receive a favor from those persons first [8]. In the context of persuasive technology, this means that a user is more likely to perform a given behavior if it is initiated by a system or another user that has done a favor to him/her before.

Scarcity. The Scarcity principle holds that people are more likely to value things they consider scarce or hard to get [8]. In the context of persuasive technology, this means a user is more likely to perform a given behavior if s/he expects to receive a special reward or social recognition that is uncommon for his/her accomplishment.

2.2   Related Work

In persuasive technology research, fewer studies have investigated how culture and gender influence the effectiveness of Cialdini's principles of persuasion. Orji et al. [11, 12] conducted a study to investigate the cultural, gender and age differences with respect to individuals' susceptibility to Cialdini's persuasive strategies. They found that, in general, people are more susceptible to Commitment and Reciprocity. However, the main focus of their studies were Western and Asian populations, the findings of which may not generalize to the African population. Selassie et al. [13] also conducted a study on individuals' responsiveness to Cialdini's persuasive principles. Just like Orji et al. [11, 12], they found that people are more responsive to Commitment and Reciprocity. However, their study focused on the work environment in Canada. Moreover, Alkış and Temizel [14] as well as Oyibo et al. [15] investigated the influence of personality traits on Cialdini's six persuasive strategies. Alkış and Temizel [14] found that each of the Big-Five personality traits influences the level of susceptibility to one or more of Cialdini's persuasive strategies, while Oyibo et al. [15] found that all Big-Five personality traits, except *Extraversion*, influence the level of susceptibility to one or more of the persuasive strategies, except Scarcity. However, aside that their studies were on the relationship between personality traits and Cialdini's persuasive strategies, they focused on non-African populations: Turkey and Canada, respectively. Finally, Oyibo et al. [16–19] conducted a number of studies on how culture, age and gender influence the susceptibility of individuals to persuasive strategies and the interrelationships among the strategies. However, they focused mainly on social influence strategies such as Social Learning, Social Comparison and Competition. Based on this brief review, we find that no study has investigated the susceptibility of Africans to Cialdini's persuasive strategies. Moreover, it is not clear whether most of the existing findings (e.g., [11, 12]) on the susceptibility of individuals to persuasive strategies can also generalize to populations that are yet to be studied such as Africa. Thus, to expand the existing body of knowledge, we investigated the responsiveness of individuals from Nigeria (as a case study) to Cialdini's persuasive strategies and the moderating effect of gender.

3   Method

This section covers our research objective, measurement instruments and participants' demographics.

3.1   Research Objective

Due to the dearth of persuasive technology research on the African population, we set out to investigate their persuasion profile using Nigeria as a case study and compare it to existing findings among non-African populations. The persuasion profile can be used by designers of persuasive applications to select the most effective persuasive strategies to reach the Nigerian population [20]. Thus, we aim to address the following research questions:

1. *Which of the six Cialdini's persuasive strategies are Nigerians most susceptible to?*
2. *Which of the six Cialdini's persuasive strategies are Nigerians least susceptible to?*
3. *How does gender influence the level of susceptibility to the six persuasive strategies?*
4. *With respect to the persuasion profile of Nigerians, can the findings based on the rating of the six strategies be replicated by the ranking of a set of proxy items drawn from the respective constructs?*

3.2   Measurement Instruments

To address our research questions, we adopted a two-pronged approach: (1) rating of the strategies; and (2) ranking of six proxy items representing each persuasive strategy. We designed an online questionnaire based on Kaptein et al.'s [2] Susceptibility to Persuasion Scale (STPS) and invited Nigerians to participate in our study. All of the 26 items in the six constructs were presented to participants in a randomized fashion. Table 1 shows three example items from each of the six STPS constructs. Each item ranges from "*Completely Disagree (1)*" to "*Completely Agree (7).*" The overarching question that preceded the items is: "*Please kindly read questions and answer the following as honestly as possible.*" In addition, we asked participants to rank a set of six proxy items (selected from the six constructs in the STPS) from "*best described me (1)*" to "*worst described me (6).*" The ranking scale was reversed during data analysis. The proxy items representing the respective strategies (constructs) in the STPS are presented as follows:

1. Authority: *I am very inclined to listen to authority figures.*
2. Commitment: *Once I have committed to do something I will surely do it.*
3. Consensus: *I often rely on other people to know what I should do.*
4. Liking: *I will do a favor for people that I like.*
5. Reciprocity: *If someone does something for me, I try to do something of similar value to repay the favor.*
6. Scarcity: *I believe rare products (scarce) are more valuable than mass products.*

Table 1. Eighteen example items from the six constructs in the 26-item STPS [2].

Construct	Example Item in each construct
Authority [4 items]	(1) I am very inclined to listen to authority figures. (2) I always obey directions from my superiors. (3) I am more inclined to listen to an authority figure than a peer.
Commitment [5 items]	(1) Once I have committed to do something I will surely do it. (2) Whenever I commit to an appointment I always follow through. (3) I try to do everything I have promised to do.
Consensus [4 items]	(1) When I am in a new situation I look at others to see what I should do. (2) I often rely on other people to know what I should do. (3) It is important to me to fit in.
Liking [3 items]	(1) I will do a favor for people that I like. (2) If I am unsure, I will usually side with someone I like. (3) The opinions of friends are more important than the opinions.
Reciprocity [5 items]	(1) I always pay back a favor. (2) When I receive a gift, I feel obliged to return a gift. (3) When someone helps me with my work, I try to pay them back.
Scarcity [5 items]	(1) I believe rare products (scarce) are more valuable than mass products. (2) Products that are hard to get represent a special value. (3) I would feel good if I was the last person to be able to buy something.

3.3   Participants

Our study's questionnaire was submitted to and approved by the ethics office of the first author's university. The questionnaire was posted on social media (e.g., Facebook) and sent to potential participants via email for a chance to participate anonymously. Participants were also given the chance to enter for a draw to win a C$50 gift card. About a total of 100 participants from Africa (continent of origin) took part in the study. However, after deleting the non-Nigerian participants from the dataset, we were left with 88 participants form Nigeria for our analysis. Table 1 shows the key demographic information of participants. Specifically, 31.8% of the participants were females, while 68.2% of them were males.

Table 2. Participants' demographics based on gender (n = 88)

Criterion	Breakdown [(Female, Male) = (28, 60)]
Age	18-24 (6, 11); 25-34 (20, 42); 35-34 (2, 6); 45-54 (0, 0); 54+ (0, 1)
Education	Technical/Trade School (0, 4); High School (0, 6); Bachelors (16, 30); Masters (9, 20); Doctorate (2, 0); Others (1, 0)
Occupation	Student (14, 40); Non-Students (14, 20)

4   Result

This section covers the results of our analysis, including the reliability analysis for the STPS constructs, average scores of the constructs, interaction analysis, between-subject analysis and within-subject analysis.

4.1   Normality Test for Dependent Variables

Before carrying out construct reliability test and Analysis of Variance (ANOVA), we checked the normality of our data using the Shapiro-Wilk and Kolmogorov-Smirnov tests. Five of the strategies failed the test of normality ($p < 0.05$). Thus, we opted for McDonald's omega (ω) reliability test [21] and non-parametric ANOVA [22].

4.2   Reliability Analysis

We conducted McDonald's omega (ω) reliability test [21] using the "psych" package in R. Our results showed that our all of the six constructs met the reliability requirement ($\omega >= 0.7$), except for Consensus ($\omega = 0.64$), which had moderate reliability [23].

4.3   Mean Rating and Ranking of Persuasive Strategy Measures

To determine the level of susceptibility to the six persuasive strategies, we calculated their overall performance. Fig. 1 shows the overall mean rating and ranking for all six constructs for the global population. Similarly, Fig. 2 shows the mean scores for the subgroups. Overall, participants are susceptible to all six strategies, as the overall average rating of each strategy is greater than the neutral score of 3.5. Specifically, participants rated and ranked Commitment (5.58 and 4.69) as the most persuasive. On the other hand, they rated and ranked Consensus (3.95 and 1.94) as the least persuasive.
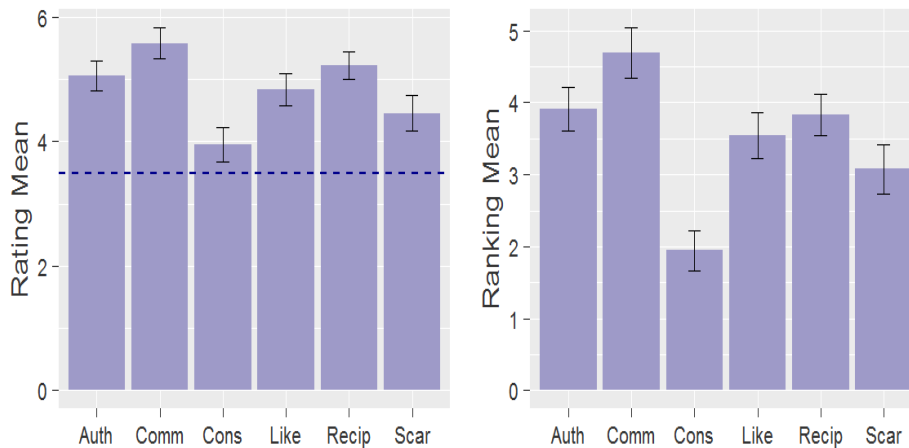

Fig. 1. Mean rating and ranking of persuasive strategies for global sample (Auth = Authority, Comm = Commitment, Cons = Consensus, Like = Liking, Recip = Reciprocity, Scar = Scarcity).
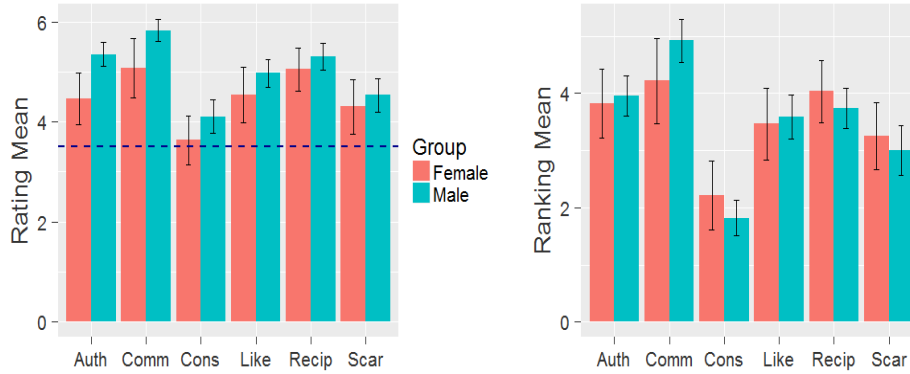
Fig. 2. Mean rating and ranking of persuasive strategies for male and female subgroups).

4.4 Interaction Effect

We carried out The Aligned Rank Transform for Non-parametric Factorial Analyses [24] using the "ARTool" package in R [25]. Our repeated measure ANOVA of the Aligned Rank Transformed Data [22] shows that there is no interaction between strategy and gender with respect to the rating measure ($F_{5, 516} = 0.58$, $p > 0.05$) and ranking measure ($F_{5, 516} = 1.12$, $p > 0.05$). However, with respect to the rating measure, there is a main effect of gender ($F_{1, 516} = 16.86$, $p < 0.001$) and a main effect of strategy ($F_{5, 516} = 17.43$, $p < 0.001$), while, with respect to the ranking measure, there is a main effect of strategy only ($F_{5, 516} = 26.96$, $p < 0.001$).

Gender Effect: Between-Group Comparison. The between-subject effect Kruskal-Wallis rank sum test [26] based on the rating measure further shows a gender difference with respect to Authority ($p < 0.01$) and Commitment ($p < 0.05$), with males being more responsive to both strategies. However, there is no gender difference with respect to the other four strategies: Reciprocity, Liking, Scarcity and Consensus. Moreover, there is no gender difference with respect to all of the six strategies based on the ranking measure as we have previously seen in the interaction effect analysis.

Table 3. Between group comparisons based on non-parametric Kruskal-Wallis test

	Rating Measure				**Ranking Measure**			
Strategy	**Global**	**Male**	**Female**	**P-Value**	**Global**	**Male**	**Female**	**P-Value**
Auth	5.07	**5.35**	**4.46**	**0.0019**	3.91	3.95	3.82	0.7230
Comm	5.58	**5.82**	**5.07**	**0.0351**	4.69	4.92	4.21	0.1166
Cons	3.95	4.11	3.63	0.0991	1.94	1.82	2.21	0.3444
Like	4.84	4.97	4.54	0.2672	3.55	3.58	3.46	0.6280
Recip	5.22	5.30	5.05	0.2357	3.83	3.73	4.04	0.4018
Scar	4.46	4.53	4.30	0.3393	3.08	3.00	3.25	0.4141

Note: There is a significant difference at $p < 0.05$ between the male's and the female's average scores that are bolded.

Strategy Effect: Within-Group Comparison. The finding of a main effect of strategy with respect to the rating and ranking measures was followed up with a post-hoc pair-

wise comparison test, using Tukey method to correct for familywise errors due to multiple comparisons. With respect to the rating measure, the result of the Friedman-Nemenyi post-hoc test (see Table 4) [26] for the global population shows that 9 out of the 15 pairwise comparisons are significant at $p < 0.05$, e.g., Commitment-Authority, Authority-Consensus, etc. Interestingly, all of the 9 significant pairwise comparisons based on the rating measure are replicated using the ranking measure. On the other hand, 4 out of the six non-significant pairwise comparisons based on the ranking measure are replicated using the ranking measure, e.g., Reciprocity-Authority, Authority-Liking, Liking-Reciprocity, etc. Altogether, 13 out of the 15of the pairwise-comparison results (86.7%) cut across the rating and ranking measures. Furthermore, for the male subgroup, with respect to the rating measure, 9 out the 15 pairwise comparisons are significant at $p < 0.05$. Out of this 9 significant pairwise comparisons, 8 are replicated using the ranking measure, e.g., Consensus-Authority, Scarcity-Authority, etc. On the other hand, 4 out of the 6 not-significant pairwise comparisons based on the rating measure are replicated using the ranking measure, e.g., Reciprocity-Authority, Authority-Liking, Liking-Reciprocity, etc. Altogether, 12 out of the 15 pairwise-comparison results (80%) cut across the rating and ranking measures. Similarly, for the female group, 13 out of the 15 pairwise-comparison results (86.7%) cut across the rating and ranking measures. However, only two of these 13 common results (Commitment-Consensus and Reciprocity-Consensus) are significant at $p < 0.05$ with respect to the rating measure and cut across both measures. The limited number of significant pairwise comparisons for the female subgroup may be due to the limited sample size.

Table 4. Friedman-Nemenyi post-hoc pairwise comparison of strategies (p-values shown)

Strategy	Global		Male		Female	
	Rating	**Ranking**	**Rating**	**Ranking**	**Rating**	**Ranking**
Comm - Auth	**0.0399**	**0.0448**	*0.0689*	***0.0035***	0.4441	0.9418
Cons - Auth	**0.0000**	**0.0000**	**0.0000**	**0.0000**	*0.1654*	***0.0033***
Like - Auth	0.8694	0.8164	0.3757	0.7272	1.0000	0.9609
Recip - Auth	0.9799	1.0000	0.9998	0.9624	0.6686	0.9961
Scar - Auth	**0.0302**	**0.0050**	**0.0032**	**0.0044**	0.9918	0.7662
Cons - Comm	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0006**	**0.0001**
Like - Comm	**0.0008**	**0.0006**	**0.0001**	**0.0000**	0.5580	0.5012
Recip - Comm	*0.2285*	***0.0420***	**0.0318**	**0.0001**	0.9993	0.9984
Scar - Comm	**0.0000**	**0.0000**	**0.0000**	**0.0000**	0.1539	0.2212
Like - Cons	**0.0002**	**0.0000**	**0.0038**	**0.0000**	*0.1116*	***0.0458***
Recip - Cons	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0020**	**0.0005**
Scar - Cons	*0.1472*	***0.0005***	*0.4076*	***0.0001***	0.4653	0.1568
Recip - Like	0.4378	0.8279	0.5530	0.9927	0.7743	0.7662
Scar - Like	0.3995	0.1793	0.4852	0.2280	0.9735	0.9961
Scar - Recip	**0.0027**	**0.0054**	***0.0084***	*0.0598*	0.3028	0.4476

Note: Bolded values indicate there is a significant difference between each pair of strategies.
Italicized values indicate pairwise comparisons based on rating and ranking do not match.

4.5 Ordering of Persuasive Strategies Based on Rating and/or Ranking

Table 5 shows the ordering of the six strategies (based on the rating and ranking measures) from the most to the least persuasive. It is based on the pairwise comparison results shown in Table 4. Overall, irrespective of the measure used, Commitment, Reciprocity, Authority and Liking are the most persuasive, while Scarcity and Consensus are the least persuasive. It appears the persuasion profile based on the rating measure does not match that based on the ranking measure due to the different ordering of Reciprocity, Authority and Liking. However, the pairwise comparison results (see Table 4) show that there is no significant difference at $p < 0.05$ between each pair of these three strategies. Thus, the persuasion profile based on the rating measure is not different from the persuasion profile based on the ranking measure. In fact, there are no instances in which the pairwise comparison result based on the ranking measure opposes that based on the rating measure or vice versa: for example, strategy A is significantly higher than strategy B based on the rating measure, but the reverse is the case based on the ranking measure. Instead, it is either the ranking-based result replicates the rating-based result or there is a significant difference in the pairwise comparison based on one measure but none based on the other measure. For example, in the global population (see Table 4), the result of the pairwise comparison between Scarcity and Consensus is not significant based on the rating measure but it is significant based on the ranking measure. As a result, overall, we conclude that Scarcity is more persuasive than Consensus for the global population, as the ranking measure helps us to break the tie between both strategies based on the rating measure. Finally, given that, in the three samples, irrespective of the measure used, Commitment comes in the first place, while Reciprocity, Authority and Liking in the second, third and fourth places (with no significant differences between them), and Scarcity and Consensus in the last two spots, we conclude that the persuasion profile of a given population based on the rating measure can be replicated to a large extent by simply using the ranking measure.

Table 5. Persuasion profiles for the Nigerians based on rating and ranking measures

Sample		Order of Cialdini's Persuasiveness of Strategies
Global	Rating	Commitment, Reciprocity, Authority, Liking, Scarcity, Consensus
	Ranking	Commitment, Authority, Reciprocity, Liking, Scarcity, Consensus
Male	Rating	Commitment, Authority, Reciprocity, Liking, Scarcity, Consensus
	Ranking	Commitment, Authority, Reciprocity, Liking, Scarcity, Consensus
Female	Rating	Commitment, Reciprocity, Liking, Authority, Scarcity, Consensus
	Ranking	Commitment, Reciprocity, Authority, Liking, Scarcity, Consensus

Note: No significant difference (at $p < 0.05$) between Reciprocity, Authority and Liking at the global and subgroup levels based on both measures (see Table 4). Thus, the rating and ranking profiles are similar.

4.6 Overall Persuasion Profile

To construct our overall persuasive profile for the global population and the subgroups, we base the ordering of the strategies on their rating-based persuasiveness in descending order. However, if there is no significant difference between two strategies based on the rating measure, we use the result of the pairwise comparison based on the ranking measure to break the tie if it turns out there is a significant difference between the pair of strategies in question. Table 6 shows the overall persuasion profile for the global population and subgroups based on the rating and ranking measures. In addition, we

have included Orji et al.'s [12] findings to enable us to compare and discus how our findings are similar and/or different from theirs in Section 5. Both studies used the same scale (STPS [2]) in the measurement of the six Cialdini's persuasive strategies.

Table 6. Comparison of Orji et al. [12] and our study's persuasion profiles

Sample	Study	Order of Cialdini's Persuasiveness of Strategies
Global	Orji et al.	Commitment, Reciprocity, Liking, Authority, Scarcity, Consensus
	Ours	Commitment, Reciprocity, Authority, Liking, Scarcity, Consensus
Male	Orji et al.	Commitment, <u>Reciprocity</u>, Liking, Scarcity, Authority, <u>Consensus</u>
	Ours	**<u>Commitment</u>**, **<u>Authority</u>,** Reciprocity, Liking, Scarcity, Consensus
Female	Orji et al.	**<u>Commitment</u>**, **<u>Reciprocity</u>**, Liking, **<u>Consensus</u>**, Authority, Scarcity
	Ours	<u>Commitment</u>, Reciprocity, Liking, <u>Authority</u>, Scarcity, Consensus

Note: the underlined indicate where males and females differ in each study, with the bold indicating higher susceptibility

5   Discussion

The main objective of our study is to uncover the level of susceptibility of Africans to Cialdini's principles of persuasion using Nigerians as a case study. The results we have presented provide answers to our four research questions stated in Section 3.1.

With respect to our first two research questions, we have shown that, regardless of gender, Commitment, Reciprocity, Authority and Liking are the most persuasive strategies, while Consensus and Scarcity are the least persuasive strategies. Pairwise, we have shown that some strategies are more persuasive than others. In the context of persuasive systems design, the implications of our findings based on the results of the global pairwise comparisons shown in Table 4 are as follows:

1. Nigerians are more likely to take a certain course of action due to personal commitment rather than because they are encouraged by an authority figure or an expert to do it [Commitment > Authority].
2. Nigerians are more likely to take a certain course of action due to personal commitment rather than because others are doing or have done it already [Commitment > Consensus].
3. Nigerians are more likely to take a certain course of action due to personal commitment rather than because they like the persuasive system or person encouraging them to do it [Commitment > Liking].
4. Nigerians are more likely to take a certain course of action due to personal commitment rather than because they will get a special reward or social recognition that is uncommon for doing it [Commitment > Scarcity].
5. Nigerians are more likely to take a certain course of action as an exchange for some favor done to them rather because they will get a special reward or social recognition that is uncommon for doing it [Reciprocity > Scarcity].
6. Nigerians are more likely to take a certain course of action as an exchange for some favor done to them rather than because others are doing or have done it already [Reciprocity > Consensus].

7. Nigerians are more likely to take a certain course of action because they are encouraged by an authority figure or an expert to do it rather than because others are doing or have done it already [Authority > Consensus].
8. Nigerians are more likely to take a certain course of action because they are encouraged by an authority figure or an expert to do it rather than because they will get a special reward or social recognition that is uncommon for doing it [Authority > Scarcity].
9. Nigerians are more likely to take a certain course of action because they like the persuasive system or person encouraging them to do it rather than because others are doing or have done it already [Liking > Consensus].

Overall, for users from Nigeria, Commitment and Consensus should be the most and least favored persuasive strategies, respectively. This indicates that, were designers to choose one strategy only from the six Cialdini's persuasive strategies to implement in a persuasive app, Commitment should be selected, as it is most likely to be effective.

With respect to our third research question on the effect of gender, we have shown that males and females differ significantly, with males being more responsive to Commitment and Authority than females. This means that the Commitment and Authority strategies are more likely to be effective in changing the behaviors of males than those of females. Thus, in the context of personalization, based on the persuasion profile shown in Table 5, Authority should be favored as the second most persuasive strategy for males. However, for females, Reciprocity should be favored as the second most persuasive strategy.

Furthermore, with respect to our fourth research question, we have shown that using the ranking method for measuring users' relative responsiveness to persuasive strategies, if well done, could be as effective as the rating method. Specifically, we show in Table 5 that the persuasion profile—Commitment being most persuasive, followed by Reciprocity, Authority and Liking (with no significant difference between them), and finally by Scarcity and Consensus—cuts across both measurement approaches for the global population and subgroups. Therefore, we conclude that the ranking-based approach (using proxy constructs' items) can be as reliable as the rating-based approach in the investigation of the relative persuasiveness of persuasive strategies. However, more research needs to be done to confirm this finding.

5.1   Comparison of our Study with Previous Similar Study
We compare our findings with Orji et al.'s [12] findings based on participants from mostly Western (individualist) countries such as United States and United Kingdom. As shown in Table 6, our findings replicate some of their findings, especially with respect to the two most persuasive strategies and the two least persuasive strategies users are susceptible to. At the global level, both studies found that Commitment and Reciprocity as the most persuasive and Consensus and Scarcity as the least persuasive. Moreover, at the subgroup level, both studies found that Commitment is the most persuasive. This suggests that, with respect to Cialdini's principles of persuasion, regardless of gender and culture [11, 12], Commitment is the most persuasive strategy. As a result, persuasive apps adopting a one-size-fits-all approach and employing Cialdini's

principles to motivate users should give priority to the Commitment strategy. Moreover, the major difference in both studies is that, while, at the subgroup level, Orji et al. [12] found Authority (4.59[1]) as the fifth most persuasive among males, in our study, we found Authority (5.35) as the second most persuasive among males. This finding may not be unexpected given the tendency of members of collectivist cultures (e.g., Nigeria) to defer to authority figures such as parents, elders, etc. [27]. Specifically, this finding is consistent with the result of Orji's [11] study, in which she found that collectivists (5.06), in general, are more susceptible to Authority than individualists (4.42). Another difference is that, in Orji et al.'s [12] study, females are more susceptible to Commitment than males, while, in our study, the reverse is the case. Moreover, in Orji et al.'s [12] study, females are more susceptible to Reciprocity and Consensus than males, while, in our study, they do not significantly differ. These differences in both studies' findings may be due to demographic differences with respect to culture and/or other factors, such as age, education level, social status, etc., which we did not consider.

5.2   Summary of Main Findings

In the light of our research questions on the responsiveness of individuals from Nigeria to Cialdini's principles of persuasion, our findings can be summarized as follows:

1. Nigerians are most susceptible to Commitment. Therefore, the Commitment strategy should be given priority when designing persuasive apps for Nigerians.
2. Nigerians are least susceptible to Consensus and Scarcity. Therefore, among the six Cialdini's persuasive strategies, Consensus and Scarcity should be the least favored in the design of persuasive apps for Nigerians.
3. Males are more susceptible to Commitment and Authority than females. This suggests that both strategies would be more effective in achieving a given goal (e.g., behavior change) among males than among females.
4. In investigating the relative persuasiveness of Cialdini's persuasive strategies, the ranking-based method (based on proxy constructs' items) can be as reliable as the rating-based method (based on multi-item constructs). Specifically, we show that the list of items presented in section 3.2 could be leveraged in the ranking-based method to determine the persuasion profile of a given population sample.

5.3   Limitations

Our study has a number of limitations. The first limitation is that our findings are based on participants' perceived persuasiveness of the strategies. As such, we cannot guarantee they will generalize to the actual context of persuasive technology use. Thus, in future work, we recommend that the relative effectiveness of the six Cialdini's persuasive strategies be evaluated in real-life applications. The second limitation of our study is that our sample size is small and we did not consider the effect of other demographic factors, such as age, education level, social status, which may moderate the level of

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[1] This value in bracket represents the overall average score of the persuasive strategy.

susceptibility of individuals to the six Cialdini's persuasive strategies. The third limitation of our study is that the participants we investigated were from Nigeria only. This may affect generalizing our findings to the entire African continent. However, the fact that our results replicate Orji et al.'s [11, 12] findings, which showed that individuals in Western and Asian cultures, regardless of age and gender, are most susceptible to Commitment, is an indication that the most persuasive strategy among Nigerians (Commitment) may generalize to the African continent.

6   Conclusion and Future Work

In this paper, we presented the susceptibility of Nigerians to Cialdini's [8] six principles of persuasion. The results of our study among 88 participants show that, overall, Commitment, Reciprocity Authority and Liking are the most persuasive strategies, while Consensus and Scarcity are the least persuasive strategies. However, males are more susceptible to Commitment and Authority than females. Furthermore, we compared our results to those of a similar study [12] in the existing literature, in which we found some interesting similarities and differences. Our contributions to persuasive technology research are in two-fold. First, we showed how responsive Nigerians are to the six persuasive strategies of Cialdini's and presented the persuasion profile for males and females. This has not been previously done. Second, we replicated some of Orji' et al.'s [12] results, making the generalization of key findings regarding the susceptibility of individuals to Cialdini's persuasive strategies possible. Specifically, our results enable us to generalize the finding—*Commitment is the most persuasive strategy among the six Cialdini's principles of persuasion*—to the Nigerian population. In future work, we intend to compare the susceptibility of Nigerians to Cialdini's persuasive strategies with that of other non-Nigerian populations to uncover possible similarities and differences.

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