

# Uses of Mobile Phones in Post-Conflict Liberia

Michael L. Best<sup>‡\*</sup>, Edem Wornyo<sup>†</sup> Thomas N. Smyth<sup>\*</sup> and John Etherton<sup>‡</sup>

<sup>\*</sup>School Interactive Computing

<sup>†</sup>School of Electrical and Computer Engineering

<sup>‡</sup>Sam Nunn School of International Affairs

Georgia Institute of Technology

Atlanta, Georgia 30332-0250

{mikeb, tsmyth3, jetherton}@cc.gatech.edu

edem@gatech.edu

**Abstract**—Liberia is a country emerging from years of protracted and devastating civil conflict. Left without any fixed line telephone infrastructure, it relies solely on the mobile phone for telephony. This study investigates the usage of mobile phones in this immediate post-conflict setting. In particular, we adopt the uses and gratifications approach to media research, giving focus to both instrumental and intrinsic motivations for use. Mobile phone users in both the capital city of Monrovia and in various rural areas were surveyed using the Q methodology, which identified distinct perspectives within these urban and rural groups. Participants were then sorted into groups where each group contained users with similar perspectives on their mobile phones. These identified groups included sets of users who saw their phones as productivity enhancers, means of connectivity to family and friends, essential business tools, technological curiosities, and sources of personal security. The idea of a phone as a stylish object was markedly rejected, especially in rural areas. We contrast these Q-sort results from Liberia with previous work from Kigali, Rwanda, finding differences especially as related to security.

## I. INTRODUCTION

Considerable attention has been given to the role of information and communication technologies as tools for development within Africa, and increasing levels of excitement have concentrated on the use of mobile phones. With some fanfare the Economist [1] announced that the “real digital divide” was in terms of the differential access to mobile telephones while computers and the Internet were of less use. Many writers have disagreed with their pessimistic assessment of computers and the Internet (e.g. [2]). Nonetheless, it is clear that mobile telephones are playing a substantial and important role in development within the global south. Indeed, compelling evidence of the macro and microeconomic effect of mobile phones in low-income countries has been mounting [3]. For instance Waverman et al. [4] find that mobile phones offer a significant macroeconomic growth dividend and one that is “twice as large in developing countries compared to developed countries”. Microeconomic benefit is also evident. For instance Jensen [5] shows that mobile phone use by farmers in Southern India increases productivity, enhances revenues, reduces waste, and lowers consumer prices.

### A. Mobile phones in Africa

Mobile phone penetration growth rates are today highest in Africa compared to all other continents [6]. The ITU

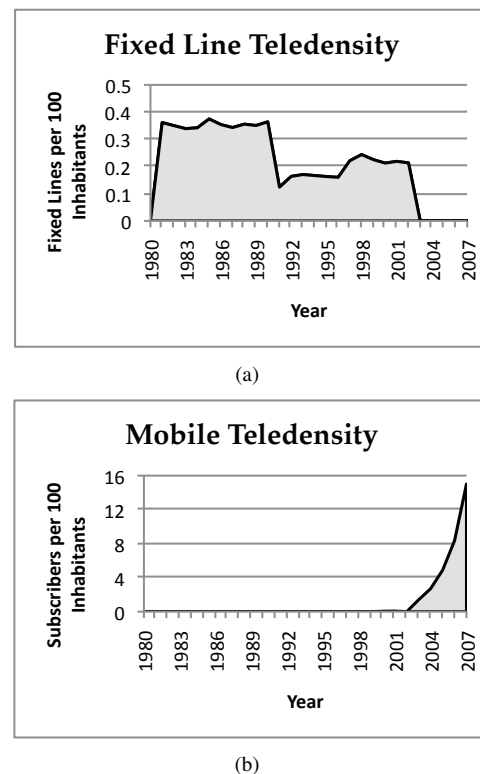


Fig. 1. Fixed-line and mobile teledensity in Liberia from 1980–2007. Steep drops in fixed lines are evident in 1991 and 2003. Introduction of competing mobile carriers in the mid 2000’s produced a soaring number of mobile subscribers. Note the difference in vertical scale between the two charts.

reports that average year-on-year growth rate for mobile phone subscribers in Sub Saharan Africa from 1999–2004 was double what it was in Europe. Indeed Sub Saharan Africa is a continent driven by mobile telephony and in 2001 the total number of mobile subscribers exceeded the number of fixed line subscribers [6]. In 2004, the mobile teledensity across all of Africa was 9.1, with the vast majority, 87%, making use of prepaid cards. Considering only Sub Saharan Africa the mobile teledensity is best approximated at 6.2% [7]. And while this number describes subscriber penetration it does not give an adequate sense of overall access and usage due to widespread sharing of phone subscriptions. Clearly, mobile

telephony is the central communication technology for much of Sub Saharan Africa.

### *B. Mobile phones in Liberia*

Liberia, established as a state in 1847 by freed African slaves from the U.S.A., is situated on the Atlantic coast of West Africa with Sierra Leone, Guinea, and Côte d'Ivoire as bordering countries. A relatively small country with approximately 3.3 million inhabitants, it is attempting to right itself after decades of civil conflict.

Unrest has been a staple within Liberia for more than 15 years with two major civil wars (1989-1996 and 1999-2003) in this time period. These years of conflict have seen nearly one-third of the population displaced and taken the lives of approximately 250,000 people. A peace was brokered and transitional government was established in 2003. A UN peacekeeping mission was positioned to keep this peace, and democratic elections were held in the fall of 2005. This resulted in the selection of Africa's first elected female head of state, President Ellen Johnson-Sirleaf.

An outcome of these years of civil conflict was the complete destruction of the fixed-line telephone infrastructure. The copper network was wholly destroyed or looted and all but one switch was destroyed [8]. It is clear from Figure 1(a) the steady decline in mainline penetration, starting from a very low level to begin with. The precipitous drops evident in 1991 and 2003 are the outcome of the two major civil wars such that by the time of the establishment of peace all mainlines were gone.

On the other hand, mobile telephone adoption in Liberia has recently been growing at a staggering rate, as shown in Figure 1(b). It has been shown that teledensity phone penetration rates are likely to over count the number of actual subscribers (due to purchased but inactive accounts) and, as already mentioned, significantly undercount the number of actual users (due to sharing) [7]. In Liberia we estimate the subscribers to users ratio to be as high as one to five. Competition within the Liberian mobile phone sector is also robust with four active operators. Indeed, usage costs are reportedly the lowest in West Africa [34]. All county capitals and most other population centers currently receive signal from at least one of the mobile providers' services, and two providers currently offer GPRS mobile internet services. Operators are actively extending both their networks and services.

The striking success of Liberia's mobile sector, which continues to develop at a feverish pace despite the resource-strapped country, is a cause for optimism.

### *C. Mobile phone usage in post-conflict settings*

Regrettably, civil conflicts such as those experienced in Liberia are not unusual in contemporary times. Indeed, while inter-state wars are increasingly less common, the incidence of civil conflict is on the rise [10]. Thus the study of ICT's within countries emerging from civil conflict is an area of considerable importance though we note a paucity of work in this area [9].

Furthermore, retrospective empirical scholarship has demonstrated the critical nature of communication amongst the people of a nation if there is to be a lasting peace instead of an all-too-frequent return to civil conflict [10]. Modern information and communication technologies can therefore, on their face, serve as tools in this process of national reconciliation if they are ably applied to these communication activities. However, to understand what it would mean to "ably" apply modern ICT's, including mobile telephony, to the process of post-conflict development requires at a minimum an adequate understanding of the current uses and meanings of mobile telephony in that environment. Such was the motivation for this study.

## II. USES AND GRATIFICATIONS

In seeking to uncover the everyday, micro-level motivations for mobile phone use among Liberians, this study draws inspiration from the uses and gratifications (U&G) research tradition. U&G as an approach originated in communications research in the mid-1970's [11], advancing the view that consumers of mass media make active choices and selectively consume media in order to satisfy specific needs. More tersely, U&G can be said to focus on what people do with media, as opposed to what media does to people [12]. More recently, the U&G approach has been applied to study adoption and use of new media technologies, including telephones [13], the Internet [14], and mobile phones [15]. Also notable about the U&G tradition is attention to a broad range of motivations, including those which go beyond the purely instrumental or utilitarian (such as increased productivity or personal safety) to the intrinsic, social, or to quote McClatchey [16], 'hedonic' motivations for use.

A typical U&G based study proceeds in one of two ways: either by starting with a hypothetical set of possible uses and seeking to confirm or deny each one, or in a more exploratory fashion, starting off with no such initial set. As will be seen, our study walks a line between these two alternatives. However, it must be noted that U&G in itself is not a method. Indeed, previous studies have employed a variety of different methods to investigate uses, including surveys [17], semi-structured interviews [13], and focus groups [18].

A recent investigation of mobile phone usage among microentrepreneurs in Kigali, Rwanda [15] also drew upon the U&G approach. In using the Q-sort methodology (also used in this study and described in the next section), Donner identified four archetypal 'factors' which speak to predominant uses of mobile phones in Kigali. They were: convenient, intrinsic, indispensable, and productive. Donner remarked on the diverse nature of those factors, saying that they "'suggest numerous paths for future research."

Our research is intended as an extension of this body of research on uses of mobile phones to an immediate post-conflict context. To our knowledge, ours is the first study of mobile phone uses and gratifications in such an environment. We believe that this context may give rise to unique motivations for use, especially given the vibrancy of Liberia's

mobile sector as described above, and the obvious importance of communication to the task of rebuilding a nation.

### III. METHODS

#### A. The Q-Sort Methodology

The Q-sort method was employed to gain insight into the nature of mobile phone use in post-conflict Liberia. In this section, the concept of the Q-sort methodology is briefly explained. However, this paper does not present an in-depth treatment, as many relevant and well written expositions and examples of the Q-sort methodology are available elsewhere. The Q-sort methodology, which evolved from factor theory, was originally developed by the British physicist William Stephenson for psychological studies [19]. Despite earlier criticism of the technique in the academic community, the technique has gained increasing attention and acceptance as a tool for research in many areas from psychology [20], to medicine [25], communication [29], social sciences [30], and education [32].

In a Q-sort study, a subject is asked to arrange a set of statements (such as those shown in Table 1), pictures, or sounds, according to some perceptual metric. In most Q-sorts, the individual is requested to place a statement into one of the slots in a grid akin to Figure 2. This grid is designed to describe a quasi-normal distribution. Each column along the grid is given a relative position along some semantic differential, for instance from strongly disagree to strongly agree. The ordering of the statements in each column is irrelevant—only the lateral ordering carries meaningful information. Some studies use a rectangular grid pattern as opposed to a quasi-normal one. We chose the latter as we believe it forces the participant to think deeply in choosing the strongest points of agreement and disagreement.

Data analysis in the Q-methodology establishes groups of individuals who sort particular traits in common places within the distribution. For example, consider a group of teenage mobile phone users in Tokyo who place great weight on their connections with friends and the stylish elements of their phone but who sort customer and work connections as low in importance; this group of people might be detected as a “factor” within the Q-sort methodology. Thus, Q-sort is said to be a person-oriented approach as opposed to a trait-oriented tool [33].

Previous work by Jonathan Donner [15] applied the Q-methodology to the study of mobile phone use among microentrepreneurs in Kigali, Rwanda. The present study is intended as an extension of that work, studying the case of mobile phone use in Liberia. In order to enable comparisons between the two studies we have used the same set of statements as was used in Rwanda (with only minor modifications). Both Rwanda and Liberia have emerged from recent civil conflict with Rwanda embarking on a path to peace starting in 1994 while Liberia saw conflict through till 2003. This study, therefore, examines how people perceive their mobile phones after only a few years of peace. And when we compare those perceptions to Donner’s study from Rwanda it is helpful

Describes Me Least			Neutral			Describes Me Best		
-4	-3	-2	-1	0	1	2	3	4
2	30	1	19	29	21	20	23	16
17	31	6	14	27	5	9	25	11
	28	22	13	15	3	4	24	
		8	18	12	26	10		
				7				

Fig. 2. An example Q-Sort, demonstrating the quasi-normal pattern into which statement cards are sorted. In practice, the full statement is printed on the front of the card, while a reference number is printed on the back. When the sort is complete, the cards are flipped and the pattern is recorded.

to recall that they have enjoyed an additional nine years of relative peace. Do those additional years explain some of the inter-state variation we have observed?

#### B. Protocol

The study required that participants arrange a set of statements as listed in Table I according to how these statements best describe their use of mobile phones. The statements were printed on flash cards for easy handling. The participants were advised to arrange the statements initially into three piles: “Describes me best”, “Neutral”, and “Describes me least”, and then to sort the piles into the appropriate categories in a quasi-normal format similar as shown in Figure 2. In addition to the statements, demographic information was requested from the respondents. The time taken for the exercise ranged from 30 to 60 minutes per participant. The statements were in English.

#### C. Participant Selection

Unlike traditional quantitative survey techniques, Q-sorts can be carried out with a relatively small number of participants from a population space. We sought participants from both Monrovia, Liberia’s capital, and from various rural areas throughout the country. This is in contrast to Donner’s study which focused entirely on the capital of Kigali. In total, 63 participants were interviewed in Monrovia. Participants were chosen at random from passers-by on a street corner in downtown Monrovia. Fourteen responses were discarded due to incompleteness, leaving a total of 49. Outside Monrovia, a total of 36 participants were selected, also at random from busy areas. In total, we visited 13 towns and villages in several Liberian counties. The age of the respondents ranged from 19 to 62 years. Participants were given a US\$5.00 mobile phone scratch card for their efforts, whether or not they completed the sort.

Print literacy was a requirement for participation. In questionable cases, prospective participants were asked to read one of the statements from a flash card and describe its meaning before they were admitted to the study.

TABLE I  
Q-SORT STATEMENTS

Concept	Statement
Connectivity	I use my mobile phone to stay in touch with my customers.
	I use my mobile phone to stay in touch with my suppliers.
	My phone gives me access to new customers.
	I use my mobile phone to stay in touch with my family.
	My mobile phone helps me come and go without worrying about missing calls.
	I use my mobile phone to stay in touch with my friends.
Information	My mobile phone helps me find work.
	My mobile phone helps me keep informed about prices in my business.
Intrinsic	Having a mobile phone makes me feel more important.
	Having a mobile phone makes me feel more connected to the world.
	I like customizing my mobile phone with accessories like special sounds and carrying cases
	I enjoy talking to my friends and family on my mobile.*
	Having a mobile phone makes me happy.
	My mobile phone is stylish.
Productivity	My business is easier now that I have a mobile phone.
	My family is better off because I have a mobile phone.
	My mobile phone saves me time.
	My mobile phone lets me get more done during the day.
	My mobile phone helps my business save money.
	My mobile phone helps me make more money in a day.
Security	I use my mobile phone for emergency calls.
	My mobile phone makes me feel more secure.
Other	Getting a mobile phone changed the way I do business.
	I am interested in learning about new features or mobile phone models.
	I can't do business without my mobile phone.
	I was among the first of my friends and business associates.
	I give my mobile phone number to many people.
	I share my mobile phone with my family or friends.
	I keep my mobile phone with me at all times.
	My mobile phone gives me more control over who I talk to, and how/when I talk to them.
	I use my phone more for business more than for social calls.

\* Due to a miscommunication, in the urban study, this statement was replaced with "I bought my mobile phone for business." This change was incorporated into the analysis that follows.

#### D. Analysis Methods

Q-analysis is usually performed using PQMETHOD, a software package developed specifically for the task. A typical Q-analysis involves several steps. Initially, a large correlation matrix is created, describing the similarities between the Q-sorts of all pairs of participants. We then look for ways to reduce the information in this matrix into an interpretable form, a process which is both iterative and partially subjective. There are several routes to this goal, a review of which goes beyond the scope of this work. In our analysis we chose a procedure similar to Donner [15]; we performed a principal

TABLE II  
FACTOR CHARACTERISTICS

		F1	F2	F3	F4
Urban	# of Defining Participants	9	13	12	4
	% of Variance Explained	10%	13%	11%	7%
Rural	# of Defining Participants	13	8	5	6
	% of Variance Explained	20%	12%	11%	12%

components analysis to identify initial factors within the data, followed by a varimax rotation to arrive at the final set of factors.

Each such factor can be thought of as an archetypal perspective; a sorting of the statements that defines one group of subjects against the others. Once these factors have been identified, a loading score is computed for each participant/factor combination, which measures the similarity of that participant's perspective to the archetypal perspective of that factor. A participant is said to load on or define a factor if their loading score for that factor crosses a certain threshold. As a result of this process, each factor is associated with a set of participants defining it. In a sense the set of participants have now been clustered into a small number of factors (we find four factors in our study) with each participant assigned to that factor that best represents them.

In the final step, the statement rankings for each participant are weighted according to that participant's loading score for the factor they are assigned to (therefore if they define the factor more closely their ranking will have more weight). Then all of these weighted ranks are combined among the participants assigned to each factor such that each factor is then described by a list of single Z-scores, one per statement, along with a  $p$  value assessing the value's statistical significance. Finally, these Z-scores are re-projected back into the original space of values from -4 to +4 (from "describes me least" to "describes me best") as shown in Figure 2. And as an aid to comparison between the groups each set of Z-scores are projected into the space described by the other factors as well.

PQMETHOD also determines for each a factor a set of "distinguishing statements" which differentiate the factor from the others. These statements are of special importance as they are most representative of the differences between the factors. It is in examining these representative statements that insight into the meaning of each factor can finally be gained.

Tables III and IV, which we will go on to study below, show these sets of factors and their most distinguishing statements, along with those statements' Z-scores and the -4 to +4 values associated with them.

#### IV. RESULTS

The Q-sort data we obtained from urban and rural participants in Liberia have been analyzed separately. This has allowed us to examine differences in mobile phone use and perception between these populations.

Following the procedures described above, PQMETHOD was used to perform our analysis. After the principal com-

Commonalities						Factor 3: Business						
Statement		F1	F2	F3	F4	Statement	Z	F1	F2	F3	F4	
I use my mobile phone for emergency calls.		2	1	2	4							
Factor 1: Productivity												
Statement		Z	F1	F2	F3	F4	Describes Me Best					
**My mobile phone helps me make more money in a day.		1.57	3	-4	0	-4	**I can't do business without my mobile phone.	1.75	-3	3	4	-2
Other Distinguishing (Relatively High) Statements						Other Distinguishing (Relatively High) Statements						
**I use my mobile phone to stay in touch with my friends.		0.8	2	4	-3	-4	*My phone gives me access to new customers.	1.49	1	-2	3	-1
**My mobile phone lets me get more done during the day.		0.49	1	-4	-2	3	**I bought my mobile phone for business.	1.19	-1	-2	3	-1
*My mobile phone helps me keep informed about prices in my business.		0.19	1	-2	2	-1	Other Distinguishing (Relatively Low) Statements					
**My family is better off because I have a mobile phone.		-0.08	0	1	-2	-2	**My mobile phone helps me keep informed about prices in my business.	0.83	1	-2	2	-1
Other Distinguishing (Relatively Low) Statements						Other Distinguishing (Relatively Low) Statements						
**Having a mobile phone makes me feel more connected to the world.		0.17	0	2	2	3	*My mobile phone makes me feel more secure.	0.21	-1	2	1	-1
*My mobile phone saves me time.		-0.36	0	1	-2	2	*I give my mobile phone number to many people.	0.14	-4	2	0	3
Describes Me Least						Describes Me Least						
**I give my mobile phone number to many people.		-1.27	-4	2	0	3	*I am interested in learning about new features or mobile models.	-0.15	-3	1	0	-2
**My mobile phone is stylish.		-1.49	-4	-2	-1	1	**My mobile phone helps me make more money in a day.	-0.4	3	-4	0	-4
Distinguishing statements: *p < .05, **p < .01						Other Distinguishing (Relatively Low) Statements						
Factor 2: Connectivity						Factor 4: Security						
Statement		Z	F1	F2	F3	F4	Statement	Z	F1	F2	F3	F4
Describes Me Best						Describes Me Best						
**I use my mobile phone to stay in touch with my friends.		2.18	2	4	-3	-4	**I use my mobile phone for emergency calls.	2.31	2	1	2	4
*I keep my mobile phone with me at all times.		1.29	0	3	0	4	*I keep my mobile phone with me at all times.	1.93	0	3	0	4
Other Distinguishing (Relatively High) Statements						Other Distinguishing (Relatively High) Statements						
**My mobile phone makes me feel more secure.		0.8	-1	2	1	-1	**My mobile phone lets me get more done during the day.	1.57	1	-4	-2	3
**Having a mobile phone makes me happy.		0.78	0	2	-1	-3	*I give my mobile phone number to many people.	1.16	-4	2	0	3
*I give my mobile phone number to many people.		0.61	-4	2	0	3	Other Distinguishing (Relatively High) Statements					
**My family is better off because I have a mobile phone.		0.5	0	1	-2	-2	**I use my mobile phone to stay in touch with my family.	1.09	4	4	-3	2
*I like customizing my mobile phone with accessories like special sounds and carrying cases.		-0.29	-1	0	-1	-2	**My mobile phone helps me come and go without worrying about missing calls.	0.85	-2	-1	-2	2
Other Distinguishing (Relatively Low) Statements						Other Distinguishing (Relatively Low) Statements						
*I use my mobile phone for emergency calls.		0.31	2	1	2	4	*I use my phone more for business more than for social calls.	0.63	3	-2	3	2
**My mobile phone helps me come and go without worrying about missing calls.		-0.3	-2	-1	-2	2	**My mobile phone is stylish.	0.16	-4	-2	-1	1
*My mobile phone helps me keep informed about prices in my business.		-1.15	1	-2	2	-1	Other Distinguishing (Relatively Low) Statements					
Describes Me Least						Describes Me Least						
**I use my phone more for business more than for social calls.		-1.33	3	-3	3	2	**I use my mobile phone to stay in touch with my customers.	-0.01	2	3	1	0
**My mobile phone helps my business save money.		-1.43	1	-3	1	1	*My mobile phone helps me keep informed about prices in my business.	-0.51	1	-2	2	-1
**My mobile phone lets me get more done during the day.		-1.6	1	-4	-2	3	**My phone gives me access to new customers.	-0.95	1	3	3	-2
Distinguishing statements: *p < .05, **p < .01						Distinguishing statements: *p < .05, **p < .01						

TABLE III  
URBAN FACTORS

## Commonalities

Statement	F1	F2	F3	F4
Having a mobile phone makes me feel more connected to the world.	3	3	2	3
I use my mobile phone for emergency calls.	4	3	2	1
I keep my phone with me at all times.	2	2	2	4
My mobile phone is stylish	-4	-4	-4	-3

## Factor 1: Business

Statement	Z	F1	F2	F3	F4
<b>Describes Me Best</b>					
**My business is easier now that I have a mobile phone.	1.66	4	0	-2	2
<b>Other Distinguishing (Relatively High) Statements</b>					
**My mobile phone helps my business save money.	0.77	2	-1	0	0
<b>Other Distinguishing (Relatively Low) Statements</b>					
**I use my mobile phone to stay in touch with my family.	0.15	0	4	4	2
**I use my mobile phone to stay in touch with my friends.	-0.57	-2	1	0	3
<b>Describes Me Least</b>					
*I was among the first of my friends and business associates to get a phone.	-1.01	-3	0	-3	-4
**My mobile phone gives me more control over who I talk to, and when I talk to them.	-1.53	-3	0	0	-2
**I share my mobile phone with my family or friends.	-1.83	-4	1	-2	0

*Distinguishing statements: \*p < .05, \*\*p < .01*

## Factor 2: Mixed

Statement	Z	F1	F2	F3	F4
<b>Describes Me Best</b>					
**I enjoy talking to my friends and family on my mobile.	2	-1	4	-1	2
**My mobile phone makes me feel more secure.	1.57	1	3	1	-2
*My mobile phone saves me time.	1.21	0	3	1	-3
<b>Other Distinguishing (Relatively High) Statements</b>					
*I share my mobile phone with my family or friends.	0.34	-4	1	-2	0
**I was among the first of my friends and business associates to get a phone.	-0.07	-3	0	-3	-4
<b>Other Distinguishing (Relatively Low) Statements</b>					
**My business is easier now that I have a mobile phone.	-0.06	4	0	-2	2
*My phone gives me access to new customers.	-0.11	1	0	1	2
**I use my mobile phone to stay in touch with my customers.	-0.68	4	-2	4	1

*Distinguishing statements: \*p < .05, \*\*p < .01*

## Factor 3: Intrinsic

Statement	Z	F1	F2	F3	F4
<b>Describes Me Best</b>					
**Having a mobile phone makes me happy.	1.4	-2	-2	3	0
<b>Other Distinguishing (Relatively High) Statements</b>					
*I am interested in learning about new features or mobile models.	0.74	-1	1	2	0
**I like customizing my mobile phone with accessories like special sounds and carrying cases.	0.3	-3	-3	0	-2
<b>Other Distinguishing (Relatively Low) Statements</b>					
**My business is easier now that I have a mobile phone.	-0.79	4	0	-2	2
**My mobile phone helps me find work.	-1.03	0	0	-2	3
<b>Describes Me Least</b>					
**I give my mobile phone number to many people.	-1.97	-1	-2	-4	-1

*Distinguishing statements: \*p < .05, \*\*p < .01*

## Factor 4: Mixed

Statement	Z	F1	F2	F3	F4
<b>Describes Me Best</b>					
**I keep my mobile phone with me at all times.	1.68	2	2	2	4
**My mobile phone helps me find work.	1.42	0	0	-2	3
**I use my mobile phone to stay in touch with my friends.	1.23	-2	1	0	3
<b>Other Distinguishing (Relatively High) Statements</b>					
*I use my mobile phone to stay in touch with my family.	1.09	0	4	4	2
**I enjoy talking to my friends and family on my mobile.	1.03	-1	4	-1	2
**My business is easier now that I have a mobile phone.	0.92	4	0	-2	2
**I use my mobile phone to stay in touch with my customers.	0.67	4	-2	4	1
*Having a mobile phone makes me happy.	-0.06	-2	-2	3	0
<b>Other Distinguishing (Relatively Low) Statements</b>					
**I use my phone more for business more than for social calls.	-0.23	3	2	2	0
*My mobile phone helps me come and go without worrying about missing calls.	-0.3	-2	-3	-3	-1
**My mobile phone makes me feel more secure.	-0.85	1	3	1	-2
<b>Describes Me Least</b>					
**My mobile phone saves me time.	-1.32	0	3	1	-3
*My mobile phone lets me get more done during the day.	-1.65	-1	-1	-2	-4

*Distinguishing statements: \*p < .05, \*\*p < .01*

TABLE IV  
RURAL FACTORS

ponent analysis, several factor rotations were computed and examined. For both data sets, a set of four factors was found to provide the best balance between explanatory power and succinctness.

Table II displays the number of participants found to load on each factor, as well as the percentage of initial variance that each explains. Each factor can be taken to represent an archetypal perspective regarding phone use among Liberians. The explained variance proportions we obtained are similar to those obtained in previous studies.

Tables III and IV show the commonalities across factors for both datasets, and the statements distinguishing each factor, ordered by Z-score. The computed ranks for each factor are also shown for each statement (F1, F2, F3, and F4). Statements

with ranks for the present factor of interest of +3 or +4, or -3 or -4, are placed under the headings 'Describes Me Best' and 'Describes Me Least', respectively. Other distinguishing statements with a high (or low) rank for the present factor relative to the other factors are placed under the heading 'Relatively High' (or 'Relatively Low').

Below, we review the distinguishing statements for each factor in an effort to interpret the nature of the archetypal perspectives they represent. We also review commonalities across factors for the urban and rural groups. These commonalities are statements which are consistently ranked positively or negatively for each of the four factors, and thus indicate agreement across most participants.

### A. Urban

*Commonalities across factors:* The urban group exhibited few points of commonality across factors. The only statement which was ranked positively for all four factors was “I use my mobile phone for emergency calls,” which was rated +2, +1, +2, and +4. No statements received consistently negative rankings for all four factors. This lack of consensus could be due to the varied sample of participants and their divergent viewpoints.

*Factor 1: Productivity:* The group of nine participants defining this factor was comprised mainly of business owners with less than 12 employees, except for a computer technology facility owner who had 30 employees.

This factor describes responses where people perceive the statements “I use my mobile phone to stay in touch with my friends” and “My mobile phone helps me make more money in a day” as rather important where the normalized Z-scores are relatively high (+3 and +2). In contrast the prestige or intrinsic statement “My mobile is stylish” was rated quite low.

It is clear that this particular group does not view the mobile phone as an object of style (-4) nor do they give their mobile phone numbers to many other people (-4). Instead, affiliates to Factor 1 recognize most significantly the business aspect of mobile telephony, followed by the security utility that the phone provides. This group, therefore, emphasized the importance of the mobile phone as a business tool rather than a fashion item. They also emphasized how the phone allows them to stay in touch with their friends (+2), perhaps as they go about conducting their business.

Overall, this group seems to see the phone as a productivity tool.

*Factor 2: Connectivity:* Thirteen participants affiliate strongly with this factor. This group of respondents has a demographic makeup of sole proprietors and other business owners with less than three employees, as well as several miscellaneous others. For this group, communication with friends is essential (+4), as is constant availability, as they admit to carrying their phone at all times (+3), and giving their number to many people (+2). The phone also makes them feel happy (+2), secure (+2), and makes their family better off (+1). On the other hand, this group rated statements related to business and productivity rather lowly, saying that they do not use the phone to find out about prices (-2), they do not use their phone more for business calls (-3), and they do not see the phone as enabling them to accomplish more in a day (-4). In sum, it seems that members of this group are primarily concerned with being available and in touch with their family and friends, and that they derive feelings of pleasure and security from that high level of connectivity.

*Factor 3: Business:* The 12 participants defining this factor bought a phone for their business (+3), use the phone to gain access to new customers (+3) and stay informed about prices (+2), and in general, feel that they can't do business without their phone (+4). On the other hand, perhaps due to the centrality of the phone in their business routine, they do not feel that the phone lets them get any more done in

a day (-2). Furthermore, they do not see the phone as a tool for connectivity with their family (-3), or as a stature booster (-4). Taken together, this set of statements indicates a business-minded group of individuals, for whom the phone is an essential tool. And indeed from our demographic notes, this group comprises business people in areas such as the oil industry, computer technology, money exchange (forex bureau), and others.

*Factor 4: Security:* This group is defined by four participants, who assign the highest rank of +4 to the statements “I use my phone for emergency calls” and “I keep my phone with me at all times”. This suggests that the safety of themselves or their loved ones is of primary concern to members of this group. The group also views the mobile as a productivity enhancer given the relatively high rank assigned to the statements “My mobile phone helps me come and go without worrying about missed calls” (+2) and “My mobile phone lets me get more done during the day” (+3). Further, the group ranked the statements: “I use my mobile phone to stay in touch with my family” (+2), and “My mobile phone is stylish” (+1) as relatively important, while the statement “My phone gives me access to new customers” (-2) was seen as relatively unimportant.

Thus this group has elements of connectivity oriented users as well as gratification since they use phones to stay in touch with family and find their phone stylish. Furthermore, they perceive the phone as offering some productivity enhancements such as getting more things done and staying in touch with customers. However, what is uniquely distinguishing about this factor is its emphasis on security with the top two statements associated with this factor concerned with this issue.

### B. Rural

*Commonalities across factors:* One of the most striking things about the rural study was that during the initial sort of the cards into three piles, most participants sorted most cards into the ‘describes me best’ pile. The second stage of the sort then became a difficult exercise in prioritization. Many participants were visibly torn on which statements to promote to the highest levels and which to leave behind.

Nonetheless, in contrast to the urban data which had few pervasive commonalities, several statements emerged as items of consensus for most participants. All four factors agreed that their mobile phones make them feel more connected to the world. That statement was ranked +3, +3, +2, and +3, respectively. Several participants spoke of communicating with family members in other countries in Africa and in the West as justification for their high rating of this statement.

There was also widespread agreement on the phone not being an object of fashion. The statement “My phone is stylish” received rankings of -4, -4, -4, and -3. During the study, many participants openly scoffed at this statement upon reading it.

Finally, while no distinct security or safety factor is identified in the rural data, there was nonetheless widespread reliance upon the phone for emergency use. The statement “I

use my phone for emergency calls” was ranked +4, +3, +2, and +1, while “I keep my phone with me at all times” was ranked +2, +2, +2, and +4. It was clear that many participants felt strongly about this function of the phone. Several participants offered compelling stories of using their phone to call for help during a robbery, to call for medical care for a loved one, or as a deterrent against sexual violence.

*Factor 1: Business:* Thirteen participants defined this factor. Of the statements distinguishing it from the others, few were positive. Most prevalent among them was the assertion that business is easier to conduct thanks to the phone, which was rated +4. Participants in this group also claimed that their phones helped their business save money. On the other hand, members of the group do not share their phone with friends or family (-4), or especially rely on it for communication with family (0) or friends (-2). Overall, this group views the phone as a serious tool that has improved their ability to conduct business, much as in the urban factor of the same name.

*Factor 2: Mixed:* This factor describes a variety of personal uses of the phone. Above all, the eight participants defining this factor enjoyed talking on the phone with their family and friends (+4). However, they rated the statement “My phone makes me feel more secure” quite high as well (+3), and they view the phone generally as a time saver (+3). No business-related statements were rated highly—the phone is not seen particularly as making business easier (0), and the phone is not used to stay in touch with customers (-2). We find this factor to be a mix of personal, productivity and security uses with a clear bias against business. Unlike the previous factors in this study, this group does not admit to a clear, single description.

*Factor 3: Intrinsic:* The five participants defining this factor were clearly enthusiastic about intrinsic uses of their phones as technological artifacts. Their most highly rated distinguishing statement was “Having a mobile phone makes me happy” (+3), and they were also uniquely keen to learn about new features or models (+2), and, less strongly, to accessorize their phone (0). On the other hand, participants in this group were not very interested in business functions of the phone (-2), or in using it to find work (-2). They also reported not giving their number out to many people (-4), the reason for which is not clear.

*Factor 4: Mixed:* Our analysis identified a large number of statements with broad meaning as distinguishing this factor. The six participants defining this factor keep their phone with them at all times (+4), use it to find work (+3), and stay in touch with friends (+3). They also find that it makes their business easier (+2), and they use it to stay in touch with their customers (+1). Thus whereas Factor 2 reveals a variety of personal uses with a bias against business uses, this factor suggests an even more general blend of valued uses.

## V. DISCUSSION

The results of our Q-sort analysis have highlighted a set of uses and gratifications for mobile phones in Liberia, some of which are particularly interesting in light of previous research.

### I use my mobile phone for emergency calls

	F1	F2	F3	F4
Urban Liberia	2	1	2	4
Rural Liberia	1	2	3	4
Urban Rwanda	2	1	-4	-3

### My mobile phone is stylish

	F1	F2	F3	F4
Urban Liberia	-4	-2	-1	1
Rural Liberia	-4	-4	-4	-3
Urban Rwanda	-3	1	-3	-3

### Having a mobile phone makes me feel more connected to the world

	F1	F2	F3	F4
Urban Liberia	0	2	2	3
Rural Liberia	3	3	2	3
Urban Rwanda	2	1	3	3

TABLE V  
POINTS OF COMPARISON BETWEEN RURAL AND URBAN LIBERIAN DATA,  
AND URBAN RWANDAN DATA FROM DONNER [15].

We discuss them below. Table V presents comparisons of several noteworthy statements.

Perhaps the most striking and unique result of this study is the prevalence of security and emergency use reported by Liberian mobile phone users. Data from Monrovia suggested a distinct factor emphasizing security, while rural data revealed security as an item of consensus. In both cases, the emphasis on security was considerably stronger than that reported by Donner [15] for Rwandan users, as shown in Table V. This greater emphasis could be due to Liberia’s much more recent civil conflict. From informal discussions with participants, it was clear that the safety and security of self, of loved ones, and of personal property is still a major concern in Liberia. This is by no means surprising. Despite the 15,000-strong UN peacekeeping mission, the country’s police force is still under development, and many ex-combatants have turned to crime as a source of financial support. In such a situation, it is understandable that a mobile phone is seen as providing security, as it allows the user to call a family member or an authority in the event of a crime or transgression. In several cases, even police officers themselves spoke of their mobile phones as a source of security.

Of all the findings of this study, this emphasis on security carries the most implications for possible future technology designs. Current phones, while providing access to centralized network security services such as 9-1-1, were not designed for an environment with weak state institutions and a lack of centralized security apparatuses. Instead one could imagine a phone design incorporating a “panic” button feature, which emits a loud noise and flashing light, and automatically contacts other phones, either in the immediate geographical area, or on a predefined emergency contact list. This feature



could be activated in an attempt to stop a crime in progress, or to act as a deterrent against potential offenders.

Another result of interest highlights a difference between urban and rural users within Liberia. While analysis of urban data revealed four fairly well defined factors, two of the four rural factors admitted to a more blurry description. We feel that this may be due to the multifaceted livelihoods characteristic of rural citizens and/or the fact that the mobile phone is often the only available ICT service in rural areas. We encountered many rural participants who reported a number of different occupations. One claimed to work for the Ministry of Immigration in addition to being a farmer. Another taught secondary school in addition to selling rubber. Several students reported also working in various family businesses. Such users are not likely to fit neatly into any one category, such as ‘business’ or ‘connectivity’—their use of the phone is more varied.

On the other hand, rural users displayed an overwhelming rejection of the phone as an object of style. As reported, participants often openly scoffed at the “My phone is stylish” statement upon reading it from the card. It seemed that the idea of a phone being stylish was absurd, and to consider it so would be shameful. This is in contrast to both the urban Liberian and Rwandan data, both of which revealed a factor in which the same statement received a positive rating, as shown in Table V. Rural Liberians universally seem to view their phones as serious tools, not fashionable accessories. While in central Monrovia there exists a group of relatively successful business people that exhibit consumerist behaviors, consumerist populations are mostly absent throughout rural Liberia. This is due to poverty and the pervasive lack of a formal economy in many of these areas. We suspect that in such a context the idea of flaunting or fetishising a phone as stylish seems disassociated with local realities. Also due to limited resources, most participants owned the least expensive, most basic phone models, and seemed to be aware of the humbleness of their devices in comparison to the phones available in the city. This awareness is sure to preempt any pretensions of fashionability.

With this in mind, the emergence of an intrinsic factor focusing on technological enthusiasms in the rural data becomes noteworthy. Members of that group expressed interest in learning about newer more advanced phones, despite the fact that they were likely to be unaffordable. Participants often spoke about this interest in technology as if it were a civic duty - that any good citizen should be up to speed with the latest technology. We suspect that this group is ultimately aspirational ascribing to a vision where technology serves as an engine of their personal, and the nation’s development.

One finding from Donner’s study which was mostly replicated in our data was the feeling that the phone supports connectedness to the world, as also shown in Table V. This finding was especially prevalent among rural users, which is not surprising given the fewer options available to rural users for communicating internationally. Some parts of Liberia, such as Sinoe County, are without radio stations, newspapers, or

internet cafs, leaving the mobile phone as the only link to the outside world.

Also common to the two studies was the finding of strong business-related factors. Our study identified clear business factors for both the urban and rural populations. In addition, several other factors rated productivity-related statements highly, such as ‘My mobile phone helps me find work.’ It is clear that the mobile phone plays a crucial role in the largely informal Liberian economy.

## VI. CONCLUSION

This study has employed the uses and gratifications approach and the Q-sort methodology to investigate mobile phone usage among urban and rural Liberians. As in previous work, several distinct user groups were identified. Urban users saw their phones variously as productivity enhancers, means of connectivity to family and friends, essential business tools, and security providers. A group of business users was also identified among rural users, as was a group of techno-enthusiasts, and two groups which eluded definite description. The multifaceted nature of these groups replicates Donner’s principal finding [15] in highlighting the diverse uses and gratifications characteristic of mobile phone users in a low-income region.

However, the chief difference between these two studies—our identification of the prevalence of security use among Liberians—is potentially important in its own right. As stated, we believe that this finding may be related to the nature of Liberia’s immediate post-conflict environment. Not only does such a finding have implications for future technology designs (which we are interested to explore), it also suggests further research into the role of ICTs in the process of stabilizing and rebuilding a nation following a civil conflict. The unfortunate fact of widespread civil conflict in today’s world makes understanding such phenomena even more important.

A more general theme that we encountered is the sheer indispensability of the phone for most users. In many cases, the mobile phone is *their only option* for communications other than physical travel, which is costly and time consuming. In other places where methods of communication are various and many, the idea of a single modality being so essential is harder to fathom. But many participants we spoke to related stories of the phone saving them many miles of travel. Businesspeople celebrated the time saved in ordering goods from their suppliers over the phone, instead of traveling by costly public transportation, sometimes only to find the supplier out of stock. One participant described a hypothetical situation in which her daughter had fallen ill and she was without a phone. How should she know where to take her, when the only doctor in the area could be in any of several different towns, each a considerable distance away? Add to this the security role they apparently perform, and it is clear that the phone is a truly indispensable item.

A weakness of this work arises from the requirement that participants be able to read. This was the unfortunate reality, since performing a Q-sort requires rapid and repeated visual

scanning of the statement cards. Unlike in a traditional survey, we felt that simply reading the statement to the participant once would not be sufficient to support the sorting process. Especially in rural areas, this unfortunately excluded a significant number of potential participants. In future, we are interested in experimenting with study designs using iconography and/or sounds in order to allow non-literate participants to share their view.

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#### REFERENCES

- [1] "The real digital divide," *The Economist*, 2005, March 12.
- [2] E. J. Wilson, M. L. Best, and D. Kleine, "Moving beyond 'The real digital divide'," *Information Technologies and International Development*, vol. 2, no. 3, pp. iii–v, 2005.
- [3] M. L. Best and C. Kenny, "ICT's, Enterprise and Development". In *ICT4D* by T. Unwin. Cambridge, UK: Cambridge University Press, 2009.
- [4] L. Waverman, M. Meschi, and M. Fuss, *The Impact of Telecoms on Economic Growth in Developing Countries*. Vodafone, 2005.
- [5] R. Jensen, "The digital divide: IT, market performance and welfare in the South Indian fisheries sector," *Quarterly Journal of Economics*, 2001.
- [6] V. Gray, *The un-wired continent: Africa's mobile success story*. ITU, 2006.
- [7] J. James and M. Versteeg, "Mobile phones in Africa: How much do we really know?" *Social Indicators Research*, no. 84, pp. 117–126, 2007.
- [8] M. L. Best, K. Jones, I. Kondo, D. Thakur, E. Wornyo, and C. Yu, "Post-conflict communications: The case of Liberia," *Communications of the ACM*, vol. 50, no. 10, pp. 33–39, 2007.
- [9] D. Thakur and M. L. Best, "The telecommunications policy process in post-conflict developing countries: The case of Liberia," in *The 36th Research Conference on Communication, Information, and Internet Policy (TPRC)*, 2008.
- [10] W. Long and P. Brecke, *War and reconciliation: Reason and emotion in conflict resolution*. Cambridge, Mass.: MIT Press, 2003.
- [11] J. G. Blumler and E. Katz, *The uses of mass communications: Current perspectives on gratifications research*. Beverly Hills: Sage Publications, 1974.
- [12] W. Chigona, G. Kankwenda, and S. Manjoo, "The uses and gratifications of mobile internet among the South African students," in *PICMET 2008: Portland International Conference on Management of Engineering & Technology*, 2008, pp. 2197–2207.
- [13] J. W. Dimmick, J. Sikand, and S. J. Patterson, "The gratifications of the household telephone: Sociability, instrumentality, and reassurance," *Communication Research*, vol. 21, no. 5, pp. 643–663, 1994.
- [14] J. Eighmey and L. McCord, "Adding value in the information age: Uses and gratifications of sites on the World Wide Web," *Journal of Business Research*, vol. 41, no. 3, pp. 187–194, 1998.
- [15] J. Donner, "Microentrepreneurs and mobiles: An exploration of the uses of mobile phones by small business owners in Rwanda," *Information Technology and International Development*, vol. 2, no. 1, pp. 1–22, 2004.
- [16] S. McClatchey, "The consumption of mobile services by Australian university students," *International Journal of Mobile Marketing*, vol. 1, no. 1, pp. 1–9, 2006.
- [17] K. Aoki and E. J. Downes, "An analysis of young people's use of and attitudes toward cell phones," *Telematics and Informatics*, vol. 20, no. 4, pp. 349–364, 2003.
- [18] F. Williams, H. Dordick, and H. Jesuale, *Focus group and questionnaire development for exploring attitudes towards telephone service*. Herbert Dordick and Associates, 1985.
- [19] W. Stephenson, *The study of behaviour: Q technique and its methodology*. Chicago: University of Chicago Press, 1953.
- [20] E. B. Brownlie, "Young adults' constructions of gender conformity and nonconformity: A Q methodological study," *Feminism & Psychology*, vol. 16, no. 3, pp. 289–306, 2006.
- [21] D. Shemmings, "Quantifying qualitative data: An illustrative example of the use of Q methodology in psychosocial research," *Qualitative Research in Psychology*, vol. 3, no. 2, p. 147, 2006.
- [22] M. Lister and D. Gardner, "Engaging hard to engage clients: A Q methodological study involving clinical psychologists," *Psychology and Psychotherapy: Theory Research and Practice*, no. 79, pp. 419–443, 2006.
- [23] P. H. D. Stenner, G. Bianchi, M. Popper, M. Supekova, I. Luksik, and J. Pujol, "Constructions of sexual relationships—a study of the views of young people in Catalonia, England and Slovakia and their health implications," *Journal of Health Psychology*, vol. 11, no. 5, pp. 669–684, 2006.
- [24] S. J. Snelling, "Q methodology and the political opportunity of feminist psychology," *Feminism & Psychology*, vol. 14, no. 4, p. 519, 2004.
- [25] A. Risdon, C. Eccleston, G. Crombez, and L. McCracken, "How can we learn to live with pain? A Q methodological analysis of the diverse understandings of acceptance of chronic pain," *Social Science & Medicine*, vol. 56, no. 2, p. 375, 2003.
- [26] L. D. Bryant, J. M. Green, and J. Hewison, "Understandings of Down's syndrome: A Q methodological investigation," *Social Science & Medicine*, vol. 63, no. 5, p. 1188, 2006.
- [27] R. M. Baker, "Economic rationality and health and lifestyle choices for people with diabetes," *Social Science & Medicine*, vol. 63, no. 9, p. 2341, 2006.
- [28] I. Goldman, "Q methodology as process and context in interpretivism, communication, and psychoanalytic psychotherapy research," *The Psychological Record*, vol. 49, no. 4, p. 589, 1999.
- [29] M. W. Kramer and P. M. Pier, "Students' perceptions of effective and ineffective communication by college teachers," *The Southern Communication Journal*, vol. 65, no. 1, p. 16, 1999.
- [30] N. J. A. van Exel, G. de Graaf, and W. B. F. Brouwer, "Everyone dies, so you might as well have fun! Attitudes of Dutch youths about their health lifestyle," *Social Science & Medicine*, vol. 63, no. 10, p. 2628, 2006.
- [31] A. C. Borthwick, T. Stirling, A. D. Nauman, and D. L. Cook, "Achieving successful school-university collaboration," *Urban Education*, vol. 38, no. 3, p. 330, 2003.
- [32] J. Szente, J. Hoot, and J. Ernest, "Parent/teacher views of developmentally appropriate practices: A Hungarian perspective," *International Journal of Early Childhood*, vol. 34, no. 1, p. 24, 2002.
- [33] A. C. McKenel, "Surveying attitude structures—discussion of principles and procedures," *Quality & Quantity*, vol. 7, no. 2, pp. 203–294, 1974.
- [34] R. Southwood, "Liberia: Four mobile companies bring lowest prices in West Africa" Balancing Act. [http://www.balancingact-africa.com/news/back/balancing-act\\_352.html#head](http://www.balancingact-africa.com/news/back/balancing-act_352.html#head) (accessed February 20, 2009).