Hidden constraints to digital financial inclusion: the oral-literate divide

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ABSTRACT
The vision that digital finance can achieve universal financial inclusion is premised on the rarely questioned assumption that the world is rapidly moving towards universal literacy and numeracy. In fact, text and arithmetic notation shape the relationship between formal finance and about a billion of the world’s poorest adults. This “oral” population, stranded outside the reach of formal employment, have neither the capabilities nor the incentives to engage in digital finance as it is currently being offered. Empirical observation of the actual capabilities and incentives of oral adults can offer transformative solutions for mobile wallet providers, NGO projects, designers and governments.

Introduction: a tale of two worlds

We live invested in an electric information environment that is quite as imperceptible to us as water is to fish. Marshall McLuhan (1969, 22)

We — readers of books such as this — are so literate that it is very difficult for us to conceive of an oral universe of communication or thought except as a variant of a literate universe. Walter J. Ong (1982, 2)

In an era when a single human invention — the mobile phone — has reached 5 billion individual subscribers in less than two decades,1 it seems paradoxical that a technology much more deeply embedded in the modern economy — writing — still has not reached about a billion adults aged 15 and over, even after a 5,000-year journey.

Literate people struggle to appreciate how complex a social process the emergence of mass literacy is, or how significant is the resulting oral-literate divide. The further in the past this transition recedes, the harder it seems to become to appreciate the divide. The United Nations Educational, Scientific and Cultural Organization (UNESCO) reported in 2005 that “[t]he transition to widespread literacy, once initiated, is not inevitable and may stagnate” (UNESCO 2005, 198). To Earl Hunt, a widely cited researcher on human intelligence, literacy is a “meta invention” that stands far above most other technologies “because societies and individuals who use [it] have a huge advantage over those who do not” (Hunt 2011, 283). In Hunt’s definition, literacy includes numeracy.

While technologies can “leapfrog” over traditional infrastructure endowments, they cannot leapfrog over traditional human cognitive endowments. Oral culture co-existed with writing for thousands of years before Johannes Gutenberg invented the first metallic type printing press in Europe. Neither printing nor literacy — unlike today’s mobile phone — were embraced quickly. The Gutenberg Bible was in Latin, a language spoken only by the elite, as were 76% of the print editions produced in Europe from the 1440s until 1500.2

In other words, the “literate divide” of the fifteenth century was initially widened by the supply-side response to the invention of printing. Today supply-side actors are widening the “digital divide” with
obscurantist financial equivalents of High Latin Mass that belong in a nineteenth century banking hall, not a twenty-first century mobile wallet.

Digital finance interfaces involve several codes that all literate and educated adults take for granted, but which are rarely learnt without adequate schooling by illiterate ones – a majority of the financially excluded population. These codes are centred on:

- Arithmetic notation
- Calendar and clock time
- Modern iconography grounded in geometric and other literate abstractions.

The literate world has been forming and gradually moving away from its oral progenitor for thousands of years. Like a cognitive analogue to continental drift, the process is stranding the oral world on other side of an increasingly widening divide.

National census data estimates that over 750 million adults were illiterate in 2015, of whom over 64% were women. Global illiteracy has dropped only 14% since 1990, and a dismal 4% since 2000 (UNESCO 2015, 13–14). Census data are based on self-disclosure at the doorstep. Direct functional literacy assessments by UNESCO suggest that the true figure today is very close to 1 billion, with a similar gender gap (UNESCO 2015, 140ff.).

The face of oral culture is increasingly feminine, and not just because girls face discrimination in basic schooling. Women’s work is less formal, less well paid, and less likely to be banked. Gender norms constrain the use and acquisition of the cognitive skills required to adapt to the formal financial system more tightly.

Research on oral capabilities, culture and behaviour exists. However, most of it resides outside of the discourse on financial inclusion. This is unfortunate, because the goal of financial inclusion – for poor women most of all – would benefit substantially from deeper engagement. This article starts by reviewing some of that literature, and then reports on results of work by the author and his colleagues on oral financial inclusion. The paper advocates for a new technical discipline: “oral information management” (OIM). The goal of OIM is to understand the drivers of oral financial inclusion and ultimately the wider drivers of oral agency more generally; and from this foundation to build safe and empowering formal financial and other services for the oral population. The advent of the smartphone is greatly expanding the scope for OIM solutions, which draw on both user experience (UX) and assistive technology.

**Literature review**

In the 1980s Walter J. Ong advanced a hypothesis on oral culture that has fundamental implications for development practice (Ong 1982). Orality refers to the modes of thinking, speaking and managing information in societies where technologies of literacy (especially writing and print) are unfamiliar to most people. The concept encompasses not just speech but a wide range of communication tools, from ideograms and numerals to distributed memory, music and dance.

The modern world views illiteracy as a skill deficit. For Ong, however, a society in which most people are not literate is one in which information is actively managed under more challenging, but also very different, constraints. This leads to consistent and measurable differences in “thought and expression” between oral and literate cultures that “have come into being because of the resources which the technology of writing makes available to human consciousness. We have had to revise our understanding of human identity…” (1982, 1).

While oral culture is adaptive, it is also conservative in tone, due to the difficulties of managing information without text (Ong 1982, 41–2). And it distrusts the harbingers of text, because of associations with fraud, loss of land and other predatory practices viewed as originating in literate culture. The gradual encroachment of literate institutions and technologies into the oral work, accompanied by little or no formal sector employment, leads to tactical adaptation.
Oral populations learn certain skills that help secure their livelihoods, but cautiously limit this investment.

For illiterate adults, the alphanumeric code that fuels the modern economy arrives in the oral world in the form of a personal transaction cost. It is no different in this sense from other transaction costs: service fees, wireless interruptions or distance from the nearest bank branch. Oliver E. Williamson, the dean of transaction-cost economics, argued that the “integrity” of transactions can only be ensured through effective two-way information flows. If illiterate clients cannot decode personal transaction records, they are faced with a hard, binary choice: exit from the transaction, or abandon hope of holding the supplier accountable for product quality. This leads to shallow and unstable relationships during which “transactional integrity” is not “decided” (Williamson 1996, 11) – or to put it another way, transaction costs are too high for the market to function efficiently, or even clearly.

Literate and oral actors talk about finance differently, making this divide more difficult to diagnose. When survey firms and researchers ask oral respondents about “saving” or “borrowing” they understand their own words to refer to money; not to the sorts of in-kind resources and relationships used to save and borrow daily by many of their respondents. When mobile wallets emerged, literate firms enabled funds transfers that utilised Indo-Arabic notation. Not only do they appear to have been unaware that poor people couldn’t write or read Indo-Arabic notation; they incorrectly assumed that person who could dial a phone number (a cardinal number) could input a cash amount (an ordinal number). While academics rarely study literacy in the context of financial inclusion, they often report on “financial literacy” – a programme that addresses neither the decoding challenges faced by illiterate adults during financial transactions, nor their oral perspective on the utility of cash and other stores of value.

Outside the financial inclusion literature, oral culture has been studied extensively (defining works include Lord 1960; McLuhan 1962; Luria 1976; Scribner and Cole 1981; Goody 1987; Schmandt-Besserat 1992). However, there remains surprisingly little research on numeric literacy, given the significance of number to the modern economy and to financial inclusion.

Oral cultures often co-opt money as a counting and calculation tool. In a study of unschooled candy-sellers in Brazil, Saxe observed that these adolescents “develop a mathematical system” based on the Brazilian currency, that non-sellers “do not achieve at the same age, if at all” (Saxe 1988, 19). Saxe made related observations in a very different context: the trade stores of the remote Oksapmin tribe of Papua New Guinea. Unschooled adults, he found, would either bring change to the shop or ask for change from the shopkeeper before transacting. They would then count out exact change for each item, buy it, and count the remaining balance, before purchasing the next item using the same procedure (Saxe and Esmonde 2004, 23–24).

Modern time measures present development practices with different challenges. It is only since the nineteenth century – with the consolidation of time zones, the virtually universal dissemination of clocks and wristwatches, and the emergence of time clocks in workplaces – that the formally linear concept of time, disconnected from natural or narrative events, has taken root on a mass scale in Western culture. The collision between this sensibility and the oral conception of time was dramatised by the poet Okot p’Bitek in Uganda, in his depiction of Lawino, a village woman married to a Westernised husband living in the city.

Listen
My husband,
In the wisdom of the Acoli
Time is not stupidly split up
Into seconds and minutes,
It does not flow
Like beer in a pot
That is sucked
Until it is finished.
(p’Bitek 1972, 72)
Reflecting on the oral conception of time in Kenya, Mbiti writes that “Since time is a composition of events, people cannot and do not reckon it in a vacuum” (Mbiti 1969, 19). Calendars and clocks do reckon time “in a vacuum” outside the events of human life, leading oral individuals to question their value.

The field of behavioural economics has opened numerous empirical avenues for research into oral financial behaviour. During historical monetisation processes, oral cultures adopt cash as a medium of exchange first, but only as a store of value much later. Cash is a highly powered medium of exchange, and illiterate adults, like the rest of us, face control issues. “If individuals with time-inconsistent preferences are sophisticated enough to realize it, we should observe them engaging in various forms of commitment (much like Odysseus tying himself to the mast to avoid the tempting song of the sirens)” (Ashraf, Karlan, and Yin 2006, 636). Oral equilibrium is filled with examples of these various forms of commitment that channel both exchange transactions and especially saving for even a few weeks out of cash into various non-cash stores of value.

Non-cash forms of saving and transacting also help illiterate adults and households to keep their mental accounts separate using internally enforced rules of thumb. In a study of savings in Cambodia, villagers reported that gold was acquired and saved for long-term goals, while chickens and pigs were for food security, and the small cash saved up in clay pots was for short-term cash expenses. Villagers who were older and better off were setting aside land for their retirement (Matthews 2005, 22–24).

Scepticism about cash is reinforced in oral culture by the “endowment effect,” which Thaler describes as “the fact that people often demand much more to give up an object than they would be willing to pay to acquire it” (Thaler 1992, 63). Each in-kind store of value is unique (e.g. no water buffalo or plank of sawn timber is identical). This reduces the relative psychological value of cash in the oral world.

A 1987 study by Nunes, Schliemann, and Carraher (1993) added an unexpected twist to Ong’s observation about trust. The researchers presented 16 third graders in Recife, Brazil (“working class children in areas with street markets”) with a series of 30 arithmetic problems (Nunes, Schliemann, and Carraher 1993, 28–48). They observed that the children preferred oral calculation strategies to written ones, because they could more easily retain numerical meaning. That is, during oral calculations the child continues to think of “two hundred”. In written calculations there is simply a “2” in the third location from the right that could accidently be shifted right or left.

The influential “triple code” model of numerical cognition (Dehaene 1992) posits that number can be physically sensed (e.g. three people are seen approaching), referenced in spoken communication (“I saw three people”), or coded in arithmetic notation (“3”). This model lends itself to understanding oral numerical behaviour, because oral numeracy skills closely approximate a “double code”, in which the third element – arithmetic notation – is poorly developed (Matthews 2016, 10). Translating between the distinctly different spoken and notational systems is neither easy nor automatic in the absence of good schooling.

p’Bitek’s depiction of Lawino, the village wife left behind by an urbanising husband, evokes a familiar narrative in which discrimination and the impact of gender norms across the formal skill-spectrum from literacy and numeracy, to participation in markets and the cash economy propel earlier male adoption of literate practices. Literacy is known to increase women’s ability to exercise independent agency. For example, a study of data from the 1981 and 1991 Indian censuses found that maternal literacy substantially reduced both overall under-five mortality rates, and the relative survival disadvantage of girls (Sen 1999, 197).

Despite the centrality of numeric text to formal finance, there has been little focus on literacy or numeracy in the context of women’s financial inclusion, beyond general observations that illiteracy can inhibit use. A recent review of the literature on women’s economic empowerment through financial inclusion provided a list of “demand-side barriers” to inclusion that made no reference to these distinctly gendered capability gaps (Holloway, Niazi, and Rouse 2017, 4). However, a study of the use of savings accounts by poor women in Madhya Pradesh found when the account was in their name and linked to a government transfer programme, they were likely to use it if they had also received an orientation programme that provided (inter alia): “the opportunity to deposit and
withdraw some amount of this money to get hands-on experience” (Field et al. 2016, 10). And a recent meta-analysis of the literature on gender and digital financial inclusion calls for closer attention to the impact of gender norms on the factors underlying inclusion, such as phone ownership, ability to travel or participate in markets, and ability to open or use accounts (Gammage et al. 2017).

The effects are visible in the markets. By early this decade GSMA’s Mobile Money for the Unbanked “State of the Sector Reports” were reporting that nearly two-thirds of mobile money accounts were dormant. Hundreds of millions of transactions were being conducted by agents on behalf of their customers: a system known as “over-the-counter” (OTC) transacting. OTC transactions typically involve an extra fee, and illiterate people choose to pay, or stay away. In surveys, they often report that they fear making errors in mobile transactions.

The online datasets for the multiple waves of the Financial Inclusion Insights survey project by InterMedia (Financial Inclusion Insights 2019) reports OTC levels. The relationship between OTC and national literacy levels appears in Figure 1.5

In 2018 approximately 184 million fewer women than men owned a mobile phone, and 327 million fewer women used mobile internet than men (GSMA 2018, 11). Illiteracy is clearly the single most important barrier to phone ownership – ahead of cost – for women in Bangladesh, Pakistan and India (GSMA 2018, 18–19). Even for men literacy is a major barrier in these nations, and it rivals cost as a barrier to phone ownership for women in Cote d’Ivoire and Nigeria. The relative strength of literacy as a variable was vividly demonstrated in a 12-month test in Tanzania, that provided 385 women who did not own phones with smartphones. At endline after 12 months, only 53% still owned them, with most others having sold them or traded down (Roessler et al. 2018).

GSMA reports that “there is a gender gap in usage that widens for more transformational, typically higher revenue services, especially mobile internet” (GSMA 2018, 24).

Efforts to address this challenge are gathering momentum. In a 2016 paper based on empirical field research with illiterate populations, Woldmariam and colleagues proposed a cash-based interface, with audio support, for mobile money in Ethiopia (Woldmariam et al. 2016). They noted that national governments may appreciate seeing national identities represented through cash images in digital money. In 2016 Hayat designed working prototypes for cash-based withdrawals, transfers and top-ups for Pakistan. Hayat envisions these to be applicable to mobile wallets, point-of-sale (POS) machines and automated banking machines (Hayat 2017). Another paper from Pakistan envisions “designing appropriate [mobile money] interfaces for low literate novice users with a focus on selection and scrolling usability.” (Ahmad et al. 2017, 1)

The research evidence, and the trajectory of market trends and design work to date lend strong credence to Ong’s thesis, and the proposition of Williamson that if Ong is correct, the result is likely to be

![Figure 1. Illiteracy and “over-the-counter” transactions.](image)
financial market failure. The most visible capability gap is place value notation: a gap previously observed by Saxe (1988) and Nunes, Schliemann, and Carraher (1993). Consistent with Mbiti (1969) and p’Bitek (1972), there was a gap in ability to read or use calendars and clocks. However, there is evidence of oral strengths that offers cognitive scaffolding for learning key new skills. As observed by Dehaene (1992) and Nuerk et al. (2011), oral numeracy skills are effective in two components of the triple code. Oral adults are already numerate – what they require is translation. Furthermore, they are already demonstrating a strong motivation to learn – that is, agency. There is gathering momentum, especially in computer science, to address the challenges illiterate adults face in using mobile money interfaces.

Ong’s thesis has limited recognition in the field of financial inclusion. However, recent evidence in the fields of numerical cognition and behavioural finance supports his central claims and offers numerous avenues for future empirical work. But if Ong is right, the digital divide will persist or even widen until practitioners address oral behaviour and psychology more realistically.

Diagnostics

Too often in my experience, development practitioners represent poor people as concrete thinkers; incapable of thinking abstractly. This claim seems to originate in a misreading of Luria’s findings from pioneering research on oral adults in Caucasus in the 1930s, in which he correctly observed that oral respondents found the literate abstractions he showed them either baffling or unworthy of serious attention (Luria 1976). A team of designers recently built on this claim to recommend that digital interfaces for illiterate users should “minimize hierarchical depth in UIs [user interfaces] for non-literate users.” (Medhi et al. 2013, 504).

But the premise underlying this approach is unproven: illiterate adults cannot afford literate abstractions any more than the semi-literate Germans struggling slowly through Luther’s writing in German could afford to read Latin. But oral abstractions – and the hierarchies built from them – dot the design motifs, stories, and technologies of virtually every pre-literate and pre-modern society. They should be tested in interface designs.

Financial numeracy

Financial numeracy can be defined as the numeracy skills required to carry out financial transactions with understanding, in real time, without help from a third person. The financial numeracy divide involves at least five key capability gaps (Table 1). A defining theme is that poor people are considerably better at oral and mental numeracy than they are at processing text.

Table 1. Five steps to financial numeracy.

| Steps                  | Description                                                                 |
|------------------------|-----------------------------------------------------------------------------|
| 1 Number recognition   | Read and write 1-digit numbers                                              |
| 2 Inputting data       | Writing or inputting financial concepts on paper or a mobile phone          |
| 3 Place value (large   | Read and write numbers up to use-needs of the local currency (Timor-Leste    |
| numbers)               | 3-, 4-digits w. decimals)                                                   |
| 4 Written calculations | Learn the arithmetic operators (+ - x ÷ =) and how to use the calculator on  |
|                        | a feature phone                                                            |
| 5 Calendar time        | Learn to use calendars, date notation (“14/7/18”) and tabular syntax        |

Source: Author's own work.
There is a feedback loop between each step (or skill) and the motivation to learn it. For poorly schooled adults, learning depends vitally on personal motivation, which is strongly influenced by anticipated use cases. There are many use cases for financial numeracy in oral societies, but they are exceptional – for example, keeping records in a shop or a savings group. Girls are less likely to see a use case for financial numeracy skills than boys: a view heavily influenced by parents, teachers and prevailing gender norms.

Two completed studies funded by the Consultative Group to Assist the Poor (CGAP) and implemented by InterMedia (Financial Inclusion Insights 2018a, 2018b; Matthews 2019) tested steps 1 and 3 in nationally randomised samples of adults in Côte d’Ivoire and Myanmar (Figure 2). The studies measured the ability to read a “long number”, defined as one between US$10 and US$100, denominated in the currency of the respondent. The surveyor voiced the number as a currency amount, and then asked the respondent to identify the correct number from five written choices on a tablet. For example, in Côte d’Ivoire the voiced number was 10,750 [CFA] francs (worth about US$19 at the time of the survey). The five written choices were “1,750”; “107,500”; “27,500”; “10,750”; and “10,075”. The first two choices are wrong by an order-of-magnitude. These choices were selected by over a quarter of the respondents in both nations. A person who cannot decode the order-of-magnitude of a digit string is unlikely to risk private use of a mobile wallet and may seek to minimise other formal financial transactions.

Not only is a marked gender gap evident, but it is clear that financial numeracy is independent of literacy. In Myanmar, where progress to mass literacy is well advanced, financial numeracy is less developed, and the gender divide is wider. In Côte d’Ivoire where nearly half the population are unschooled, financial numeracy is more advanced than literacy across the whole population, and the gender divide is narrower in financial numeracy than literacy.

These differences can likely be attributed to the progress of monetisation and formalisation of the economies in the two nations, and the respective constraints faced by women in handling money and engaging in economic activities outside the home.

The ability to read a long number proved to be a very effective predictor of engagement with mobile money, as seen in Table 2. InterMedia concludes that in Côte d’Ivoire “financially numerate
adults had nearly 2.5 times greater odds of having a registered mobile money account than did the average adult” (Financial Inclusion Insights 2018a, 16).

As the digital revolution deepens it is becoming increasingly difficult for adults of either sex to avoid conducting formal financial transactions. While every oral household is affected by this creeping technological transformation, the most profoundly affected populations may be poorly schooled women who must head households, and households with no literate members.

**Agency**

The mobile phones poor people can afford are, for the poorly schooled, a cognitive nightmare. They are almost entirely alphanumeric, with some unhelpful supplementary symbols (such as ∼ @ # $ % / ^ + = < > * & ©). Their rapid diffusion is rightly celebrated, but the mental burden they place on illiterate users leaves no grounds for complacency.

Retail financial services are based on a clear and moral premise of privacy. The technologies used to deliver these services are all oriented around supporting this privacy. Yet it quickly becomes evident to anyone observing financial transactions in oral contexts that this privacy is routinely breached. Poor people give their personal identification numbers to mobile agents to get help with payments. Groups of people squeeze between the privacy barriers of an automated banking machine to work out how to withdraw cash. Women wait for strangers to enter a banking hall to help them fill in withdrawal slips.

Staff of microfinance organisations seem unperturbed. “Her children will read it for her when she gets home” they will say of their borrowers, “and if she’s uncertain – she trusts us – she’s sure to ask us.” Transaction cost economics might have predicted that, while an illiterate woman might take immediate cash in exchange for thumbprints on a document she can’t read, she would be much less likely to give up cash for such a record.

To understand the dynamics behind this situation better, My Oral Village began testing various skills, focused on the use of financial services, beginning in Bangladesh in 2012. Illiterate users of microfinance services could not read written numbers larger than 1–2 digits, and sometimes could not read those, either.

However, both men and women could count cash very well. If their currency required thousands or millions of units to make up the equivalent of one US dollar, and they were active in any sort of cash market, they could count and calculate cash into these ranges.
This seemed to be an unexpected mix of capabilities. If a person can learn how to count cash into the millions, why would he have trouble learning how to read numbers into the hundreds? Adaptation to the cash economy – while by no means complete – seems to be far more advanced than adaptation to the formal financial system.

Based on direct observation in nine nations in Asia, Africa and the Pacific, it has become very apparent that economic value, and the way the written numbers it generates mesh with traditional numeracy skills, matters. In Tanzania most villagers rarely use numbers with more than two digits in their daily lives – except when dealing with the Tanzanian shilling, which trades at about 2,000 to US$1. This plunges them into 4- and 5-digit numbers, with no conceptual bridge to help them link the numbers of village life with the monetary ones. By contrast, villagers in the Solomon Islands stored and counted yams, and used “shell money” for centuries. Villagers tested were usually comfortable reading 3-digit numbers, which is adequate to deal with their much higher-valued currency.

Cash is a technology that was designed in a world where mass literacy had not yet taken root. My Oral Village observed that oral users learn to use it by recognising colours, pictures, and relative sizes of notes. Some, but not most, have learnt how to read the inscribed Indo-Arabic notation. Many of the core abstractions that drive the modern economy are embedded in Indo-Arabic notation – for example standardised nominal values, an explicit formal zero and place value, and a linear and infinite number system. These are supported by an established ecosystem of institutions and practices in every nation on earth. In principle digital devices can do a far better job of easing this learning process than paper. But it must still realise this potential.

**Design**

There are high hopes for achieving universal financial inclusion as smartphones follow their “dumb” cousins into the world’s households.

But so far design is not keeping up with or adapting to the challenges of hardware dissemination. Take the example in Figure 3. In testing with oral adults in rural parts of northern India, they experienced perplexity when asked to guess what any of these icons was attempting to communicate (Matthews et al. 2017).

First, the rupee symbol was virtually unrecognised. The + symbol is also unfamiliar, or if learnt in school two or three decades earlier, has long since been forgotten from lack of use. The exact stylistic flourish that makes an arrow resemble a “+” sign (Figure 4) may be easily digested by a schooled adult thoroughly familiar with both symbols. But it is going to trigger confusion and uncertainty even in a semi-literate adult, whether or not they would normally experience confidence in dealing with arrows or plus signs. She may suddenly wonder if the + means something different – something somehow related to the stylised arrow. During a financial transaction with money at stake, this sort of uncertainty could easily trigger abandonment.

When designing for the oral segment, usability – not “UX” – must take precedence. What does this mean in practice? Norman (2013, 10) writes:

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**Figure 3.** Mobile wallet design, with typical iconography.
When we interact with a product, we need to figure out how to work it. This means discovering what it does, how it works, and what operations are possible: discoverability. Discoverability results from appropriate application of five fundamental psychological concepts: affordances, signifiers, constraints, mappings and feedback.

These psychological concepts involve a relationship between the user and the device and are based on assumptions about the user’s capabilities and motivations. Digital voice is by definition “oral”, so it is not surprising if it sometimes hailed as the future of digital financial inclusion. While voice is integral to optimal future solutions, mixed solutions (various design elements including voice) will always be superior to voice alone. They offer oral users reliable, real-time cross-checks during stressful transactions. This increases the sense of personal security and reduces the risk of error.

Of even greater importance is the challenge of building oral skills. Stress in financial transactions drops when users have cognitive resources which are better aligned with their real-time challenges. Planning for the future in cash- or account-based form requires skills that cannot be acquired easily through voice interactions alone.

Finance is filled with literate abstractions. These are so prevalent a search for “interest” at The Noun Project in December 2018 generated the icons in Figure 5, mostly centred on “%” symbols, which are even less well understood by oral adults than 3-digit numeral strings.

The Google images for “a month ago” almost all had either this text in them or relied on different text to make their point. Considering that most oral adults cannot decode a calendar (which depends on tabular syntax), much less a written reference to time, this aspect of design requires far greater intentionality.

**Figure 4.** Detail.

**Figure 5.** Examples of modern images for a financial abstraction.
In a study in early 2018 in India, My Oral Village asked 100 mostly oral adults to take ten 1-digit square blocks – one for each of the digits 0–9 – and arrange them from smallest to largest.\(^6\) The most common error came as a surprise. Almost without exception, they put the 0 after the 9 – much as it typically appears on physical and digital keyboards on mobile phones. When asked to clarify, it became evident that the very idea that the 0 can be a separate 1-digit number continues to confound most unschooled and poorly schooled people.

Just as icon designers assume that the user is thoroughly familiar with plus and arrow signs, digital hardware designers assume the user is thoroughly familiar with the existence of the 1-digit zero – which they place after the 9 on computer and phone keyboards, as well as in most digital equivalents (see Figure 6).

It is entirely possible to develop apps that will empower illiterate adults to manage financial transactions, keep their own microenterprise records better, and even govern local institutions competently. But NGOs have struggled with orality, building (for example) apps that are heavy with both text and Indo-Arabic notation for use by savings groups in some of the world’s poorest and least literate communities. These meet with modest success: some members in most groups are literate. But this success comes at a heavy cost: it drives all the responsibility for record-keeping and transaction processing onto a literate minority, undermines democratic governance by limiting the ability of other members to exercise oversight or catch errors, and leads to burnout among the few who are capable of performing the tasks.

NGOs often develop training materials that integrate very simple picture and stories for microenterprise and savings groups. But these materials tend to make two important errors. First, they conflate orality with simplicity, and in the process fail to capitalise on the cognitive strengths of

![Typical keyboard layout in feature phones owned by oral users.](image)

**Figure 6.** Layout of a typical numeric input editor.
oral cultures. Second and even more importantly, this approach is confined to training materials – that may only be seen once or twice – and is never mainstreamed into transactional materials that their beneficiaries must use regularly. It is only in the transactional context that sustained impact, due to sustained exposure and reinforcement of content, can be expected.

Despite a clear roadmap focused on usability, designers in financial inclusion have shied away from illiteracy. In the best cases, they design for “low literacy”, seeking to offer relief from an over-abundance of irrelevant text but leaving critical components of the transaction process fundamentally dependent on users’ ability to read and input alphanumeric code.

**Bridging the two worlds**

The bridge between the formal financial sector and the oral world is built through the science and practices of OIM. McLuhan warned us that we would not see the message in our media until we began to pay careful attention, and that attention can build a much more positive second stage in the work of bridging the digital divide. The first is to note the significance of financial numeracy: the numeracy expected of all users of formal financial services. This human capability may be as elementary to genuine financial inclusion as literacy is to development as a whole.

The following are some actions that stakeholders in financial inclusion can take immediately towards building those bridges.

**Digital financial services (DFS) suppliers**

Almost every DFS provider in the developing world has senior staff members who grew up in villages, still return to villages during festivals, and have illiterate or semi-literate family members and relatives. These staff can serve as valuable advisors to any design initiative and offer other staff a window into oral financial behaviour and financial practices in the oral market segment.

The first step for any DFS supplier committed to an oral market segment is to diagnose the mismatch between their existing interface designs and the typical information needs of the segment. Focus groups must exclude literate members – even as observers. They will speak on behalf of – and over – illiterate members in any mixed group. Real-time awareness of the target interface should be tested methodically, and specific gaps in understanding identified for remediation.

Developing OIM designs requires a champion, typically either a product or marketing manager, or an external consultant. There are a few resources available to help with process (CGAP 2016; Matthews 2016; Woldmariam et al. 2016), and a step-by-step manual is under development at My Oral Village.

**NGOs**

NGOs have expertise in identifying use cases that matter women and girls, but often miss the media dimension, impairing their impact. Projects reaching poor microentrepreneurs and savings group members should empirically test literacy and especially numeracy among target beneficiaries during baseline assessments or even earlier. They should then develop microenterprise and group record-keeping systems that match the capabilities of most prospective users.

Projects working with microentrepreneurs or savings groups should integrate cognitive targets for the beneficiary population. If only a quarter of the population can read a 4-digit number at baseline, can the project hit 50% by endline? SIM (subscriber identity module) -enabled tablets are also powerful tools for building capabilities in groups and training programmes. Many individuals reached will be a decade or more away from owning their first smartphone, and the development of effective apps that bridge this divide is more urgent than ever.

Among the documents that can and should be adapted for oral use – both before and after digitisation – are business records, microcredit contracts, savings group ledgers and “bank linkage” contracts.
**Human-centred designers**

The design challenge of developing financial interface solutions for illiterate and innumerate adults offers an excellent thought experiment. There are many possible solutions and endless distinct variations by financial product and context. The main barrier is our own unconscious biases: the result of lifetimes making our way in cultures where text is the foundation of all formal communication.

This challenge extends beyond the illiterate user to literate loved ones who want to see their unschooled mothers, sisters and other relations mastering digital finance. Good design can make sharing by schooled “coaches” as easy as navigation and inputting by illiterate adults.

The first principle of design for oral financial inclusion is to create a safe context for transacting, and the second is to identify key skill gaps and build cognitive bridges that allow users to safely learn vital adaptive skills. These are the main tasks of OIM designers. These tasks require extensive time and experience working with oral and illiterate financial services users, testing designs for usability, guessability and memorability, as well as UX.

There is a need for a global library of OIM designs that are open source and freely available to financial services providers, governments and other interested parties. This is a project that is naturally led by designers. It should begin with graphical “keyboards” for inputting cash sums and a set of core “oral icons” or ideograms that evoke the core concepts underlying a digital finance transaction.

**Researchers**

There is a wide-open research frontier on oral culture and behaviour in both numerical cognition and behavioural economics. The science of oral information management is built on a systematic study of oral cognitive resources and incentives to learn. There has been considerable research into the development of numeracy and literacy in children and even adults in literate cultures. But there has been far less research into these processes among children or adults in oral ones.

There is also considerable scope for research into oral financial behaviour, which could open many new avenues for product development in DFS. How do oral discount rates on investments and losses work? How do mental accounting and risk management decisions work in the context of oral stores of value? How are historical processes of monetisation affected by the fact that cash has no endowment effects? There is a long list of possibilities.

The role of gender norms and household bargaining is attracting growing attention as a factor in the digital divide between the sexes. So far however, this research has paid little attention to cognitive capabilities or division of cognitive labour. Who handles and counts the money, and why? Who writes numbers? Who uses a calculator or makes mental calculations? What incentives and use cases drive these behaviours? This line of enquiry may yield openings for fruitful interventions.

**Governments**

The first step in grappling with the scope of this challenge is to conduct national and regional tests of basic financial numeracy. The development of a global database that tracks basic financial numeracy comparably across nations would help both governments and private financial services suppliers to benchmark readiness for digital financial inclusion among populations that matter to them. This could be a high impact intervention, given the centrality of this type of numeracy to financial inclusion, and the salience of the cognitive prerequisites for financial inclusion to ending poverty.

Central banks are already focused on maintaining stable currencies, but not always in the value-range that allows users to easily grasp the connections between the numeracy they use in their livelihoods, and the numeracy required to function in the modern economy. There is scope for more human-centred design: for example, long digit-strings are best grouped in 3-digit clusters according to the global standard, (e.g. 10,000 or 10 000, not 10000). This makes it easier for unschooled adults to learn digital notation.
Notes

1. This milestone was crossed in the second quarter of 2017. Together, these 5 billion individuals have 7.7 billion mobile subscriptions (GSMA 2018).

2. Retrieved from the Incunabula Short Title Catalogue, British Library (https://data.cerl.org/istc/_search; accessed 9 January 2019): 30,518 editions were printed during this period that concluded in 1500.

3. Ong (1982) explores these “resources” in depth in Chapters 3 and 4, on the psychodynamics of orality and literacy (31–77 and 78–113, respectively).

4. Citing an example from the overwhelmingly oral context of twelfth century England, Ong (1982, 95) states that “[w]itnesses were prima facie more credible than texts, because they could be challenged and made to defend their statements, whereas texts could not…”

5. For details about this survey project, conducted in eight countries by InterMedia, see http://finclusion.org. Datasets utilised by the author are available at http://finclusion.org/data_finder and http://finclusion.org/reports.

6. This study of oral spatial cognition will be published later in 2019.

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