Experiments with passive measurement of print

Using RFID for print research has its limitations – at least so far, says **Jay Mattlin**, MRI

UNTIL RECENTLY, TELEVISION was the only medium whose audience was measured at least somewhat passively. When the internet arrived, it joined TV among the media that could be measured passively, through tracking clickstream activity. More recently, radio has begun moving towards electronic passive measurement. Print now stands alone among major media in relying exclusively on self-reports all over the globe.

Advertisers and agencies continue to pressure publishers to join the march towards passive measurement or risk being relegated to the category of 'old media.'

Unlike TV, radio and the internet, magazines and newspapers do not leave any kind of electronic trail. To measure printed media in the same way as electronic media, it would be necessary to give them an electronic footprint. And one possible way to convert printed pages into electronic transmitters, many believe, could be through radio frequency identification (RFID) technology.

RFID refers broadly, in the words of www.rfidjournal.com, to 'technologies that use radio waves to automatically identify people or objects'. RFID 'tags' are like powerful electronic barcodes, but can carry much more information than barcodes, such as the serial number of an individual item. And it is possible for an RFID scanner, a 'tag reader', to read an RFID tag without being very close to it and without being in its line of sight.

Mediamark Research & Intelligence (MRI) began exploring RFID technology in 2004 to determine whether this technology could be harnessed to measure magazine audiences. As the provider of the currency for US magazine audiences, MRI sought to prepare itself for the day when it might become technically and economically feasible to deploy this technology for passive print measurement. For reasons enumerated at the end of this article, plus the US media industry's increasing focus on exposure to advertising rather than the vehicles that carry it, we decided to focus, at least initially, on:

- obtaining more precise measurement of time spent with a magazine issue,
- obtaining more precise measurement of reading occasions
- measuring levels of exposure to individual magazine pages.

In 2005, MRI commissioned an engineering firm in Cambridge, Massachusetts (an offshoot of the MIT Media Lab), to develop RFID sensing solutions to meet these objectives. Our approach was to create an 'intelligent' magazine with RFID equipment embedded within it that would track when individual designated pages had been opened and when they had been closed. We aimed to measure each reading occasion, rather than each reader.

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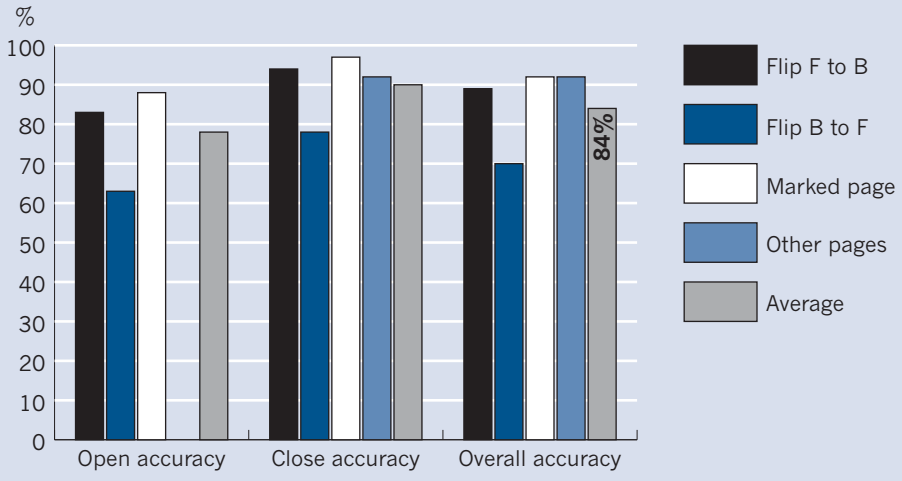
In the first set of prototypes, an RFID 'sensor card' with tag-reading capabilities was affixed to the back of a magazine and sensing elements were placed on three designated pages containing ads. To test these initial prototypes, we conducted a set of experiments in MRI's offices with employees, their family members and friends. The RFID equipment was installed in eight magazines, ranging from 72 pages to 376 pages in length. Four of the magazines were saddle-stitched, four perfect-bound.

There was a standardised protocol for the tests. Each subject was asked to complete a series of actions with one magazine. They were first told to flip the magazine from back to front, then front to back, then to turn to specific pages around the first ad for 10 seconds, then to the ad itself for 10 seconds, then to pages after the first ad for 10 seconds. The sequence of steps was repeated for the second ad and the third ad. MRI ran this protocol 63 times with a total of 35 subjects.

FIGURE 1

Performance of first set of prototypes



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Overall, as can be seen in Figure 1, the system correctly identified openings and closings of the three ads 84% of the time. When subjects were directed to turn to a marked page with an ad, it detected the opening of that page 88% of the time (see Figure 1).

The system was generally stronger at identifying the closing than the opening of a page. It was less reliable at detecting exposure when the magazine was flipped from back to front than when it was flipped from front to back, or when subjects were asked to turn to specific pages. We also found that the system worked better with saddle-stitched magazines than perfect-bound, that it was more successful with thinner magazines than thicker, and that the accuracy scores of the three ads were pretty close. It appeared that the system had greater difficulty in identifying openings and closings when the magazine was placed in the subject's lap – unless the magazine was loosely placed in a clear plastic cover to stabilise the pages.

Based on the results of this initial experiment, MRI commissioned a second set of eight prototypes. In this set, all the magazines were bound into clear plastic covers and the tag was tucked into a flap of the plastic cover. This cover made the hardware less obtrusive.

The second system represented an expansion and advance over the first. The tags in these prototypes were equipped with a memory, which stored the data on openings and closings that were registered. The active tag in the magazine cover was continually logging all activity with the magazine, no matter where it was taken. The magazine's opening and closing history could be downloaded later with the aid of a tag reader. In addition, the software for this system showed and stored the *time* of each opening and closing, instead of just an open/close indicator. This second set of prototypes was divided into two groups. One group registered the opening and closing of the magazine itself, as well as two ads (the 'dual-purpose' group); the other group registered only the opening and closing of the magazine (the 'single-purpose' group). Altogether, we conducted 87 tests of this second system: 42 dual-purpose and 45 single-purpose.

As can be seen in Figure 2, the advanced functionality of the second system did not improve its ability to detect openings and closings of pages. As with the first test, the system's performance was stronger for closings than openings, and stronger in the traditional front-to-back reading mode than back-to-front. Also consistent with the first test, the longer magazines underperformed the shorter ones. The performance of the perfect-bound magazines was stronger in this set of prototypes than that of the saddle-stitched magazines.

The page opening-and-closing accuracy rates were based on just four prototypes. The magazine opening-and-closing accuracy rates in Figure 3 were derived from testing eight prototypes. And on ▶

FIGURE 2

Performance of second set of prototypes for detecting page openings and closings

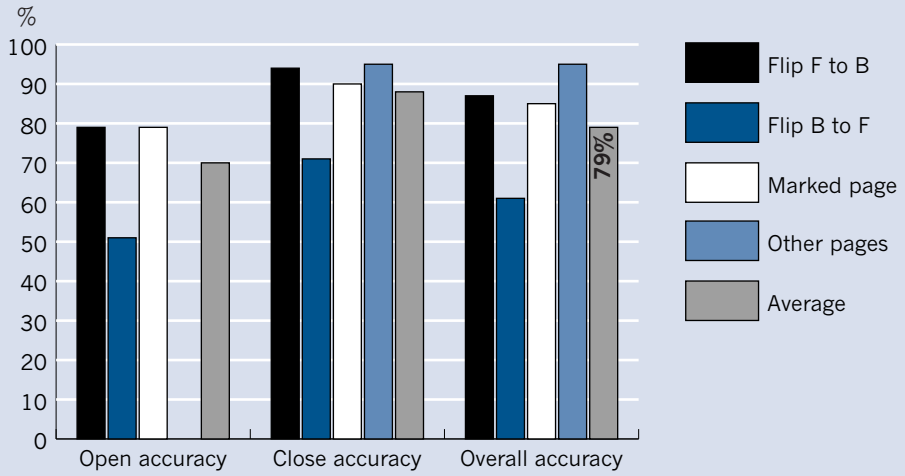


FIGURE 3

Performance of second set of prototypes for measuring magazine openings and closings

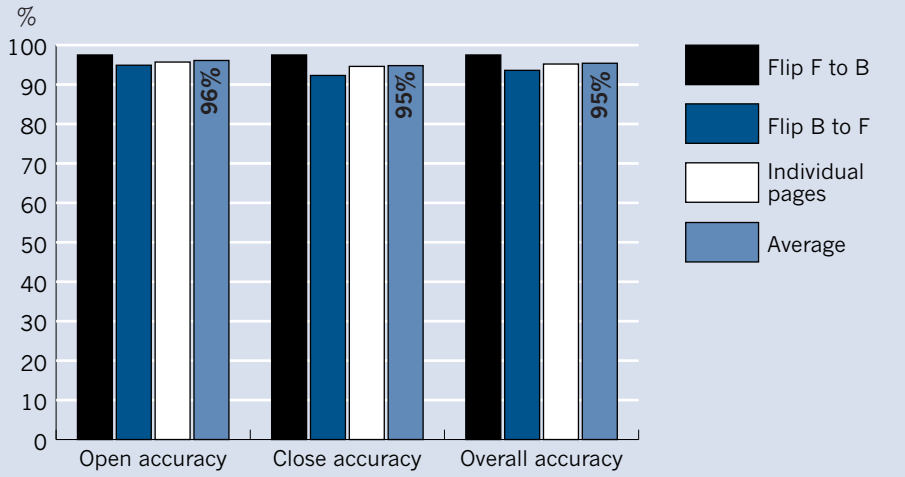
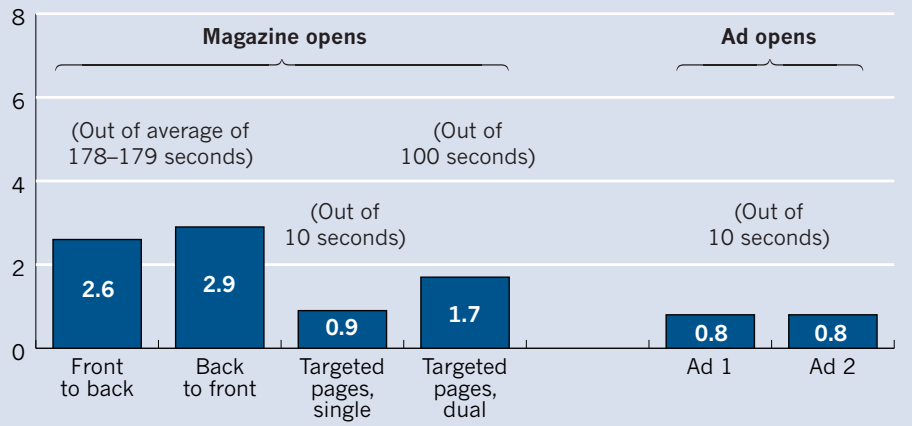


FIGURE 4

Average absolute difference between actual and recorded time



this key metric, the technology worked very well, detecting magazine openings and closings 95% or more of the time, on average. Even when flipping the magazines from back to front, the system accurately registered opening and closing an average of 94% of the time. In fact, out of the eight prototypes, four had absolutely perfect scores across all the tests conducted with them.

The system's ability to measure the amount of time that the magazine is open was also a resounding success.

▶ When we asked subjects to flip through the magazine from front to back and from back to front, the average absolute difference between the amount of time the system registered the magazine as open and the amount of time that it was actually open was less than three seconds out of an average of nearly three minutes that the magazine was open.

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▶ When we asked subjects to turn to the marked pages for 10 seconds, the system's recorded time for the opening of the magazine was off by an average of less than one second.

▶ The system's time-recording function was equally reliable for monitoring openings to individual pages (see Figure 4).

These experiments have demonstrated that RFID technology can be used to meet our first two objectives of developing a way to passively measure the number of times and the amount of time a magazine is open, and shows some promise in addressing the objective of measuring magazine page exposure. MRI plans to continue to refine this technology and continue testing it in public places. In the US, MRI and Waiting Room Subscription Services have announced plans to cooperate on testing the technology in waiting rooms, which are a natural environment for magazines with plastic covers.

In the long term, it may be possible to extend this technology into a means of monitoring all magazine consumption passively, but a number of obstacles remain to applying this technology to audience measurement. Any such system would have to overcome a number of technical limitations.

▶ Our system does not work well on metal tables, because metal interferes with RFID sensing.

▶ High-impact ads, such as pop-ups, music-playing inserts and fold-outs, which have become increasingly common in the US, are more difficult to measure with our technology, because they alter the way magazine pages naturally fall

▶ The RFID tag and the surrounding hardware in our system would not, at this point, fit in digest-sized magazines

▶ We learned that very thick magazines represent a challenge for our system

While we believe these challenges are not insurmountable, it will take time to address them all. But even if all these challenges are overcome, there remain other considerations that could slow the advance of passive audience measurement for print:

▶ Political issues: Privacy advocates have already launched an anti-RFID movement, which has blocked some retail tests of the technology in Europe and the US.

▶ Research issues: If passive measurement of print required respondents to carry a tag-reading device, magazines and newspapers would risk massive under-counting of their audiences because the places where people read magazines and newspapers may be those where they would be unlikely to carry portable electronic devices (for example, airplanes, the beach, doctors' examining rooms, in bed).

▶ Cost: The cost of placing RFID equipment in every copy of every issue of every magazine will be prohibitive for the foreseeable future, even for the cheapest (and least powerful) RFID tags available today. Moreover, the research costs of maintaining a print measurement panel would dwarf the costs of today's print measurement surveys.

This technology holds considerable long-term promise for enabling print to enter the club of electronically measured media. But, in the short term, tracking magazine pick-ups and time spent with magazines in public places is the application we regard as most feasible for this passive monitoring technology. ■

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