Use of Passive Electronic Measurement to Complement More Traditional Data Collection Methods

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Abstract

In traditional television audience measurement, household participants are actively required to participate by logging in and out of a device to determine who is watching what programs. As a complement to this more traditional data collection method (i.e., logging in and out) Nielsen is investigating the utility of a non-traditional electronic collection measurement tool that requires no "active" involvement from participants. More specifically, this device is designed to count the number of people looking at a television, with no interaction from the viewer. It uses image sensors to capture the reflection of Infrared (IR) light from the unit. Special software determines if a face is detected, and counts each face as one person. This paper will: 1) Report on the general acceptance of this type of counting technology by the general public gathered through focus groups, 2) Discuss the types of recruitment materials and communication strategies needed to best describe this very new collection tool (i.e., infrared technology) while simultaneously increasing the acceptance of it, 3) Report on the panel's acceptance and willingness to have this type of technology in their home, and 4) Discuss the accuracy of the collection tool. The implications and the use of this type of technology will be discussed in terms of how it can be used to complement and further improve on the data quality gathered from more traditional (existing) data collection methods.

Key Words: electronic measurement, passive measurement, audience measurement, media behavior

1.0 Background

In traditional television audience measurement, household participants are actively required to participate by logging in and out of a device to determine who is watching what programs. Through this more "active" collection methodology, this device readily captures who's in the television audience (i.e., who's watching or listening to TV) through pre-assigned button numbers where household participants are asked to press their button by logging in when watching or listening to television and to log out to indicate when they are not watching or listening to television. This collection methodology also allows us to not only know whose watching television but to also gather basic demographic information like the age and gender of who's watching.

As a complement to this collection method just described, Nielsen is investigating the utility of a non-traditional electronic collection measurement tool that requires no "active" involvement from participants. More specifically, this device is designed to count the number of people looking at a television, with no interaction from the viewer. It uses image sensors to capture the reflection of Infrared (IR) light from the unit. Special software determines if a face is detected, and counts each

face as one person. In theory, the development of a more passively methodology could supplement and further improve upon the current traditional methodology.[1] If the passive methodology (though still early in the development & design phase) is deemed to be extremely accurate it could potentially lead to the development of a completely passive system for the collection of television audience data whereby there is no longer a need for participants to actively push their buttons. Thus, the focus of this paper is to: 1) report on the general acceptance of this type of counting technology by the general public through targeted focus groups, 2) to describe how the lessons learned from the focus groups shaped the types of recruitment materials and communication strategies needed to best describe this new (and passive) collection tool while simultaneously increasing it's acceptance, 3) to discuss the willingness of panel participants to have this device in their home, and 4) to discuss the overall accuracy of this collection tool. And lastly, the implications and the use of this type of technology will be discussed in terms of how it can be used to complement and further improve on the data quality gathered from more traditional (existing) data collection methods.

2.0 Methodology

Past internal Nielsen research on devices similar to the one described here (Nielsen Company, 2008) did captured concerns expressed by participants about passive technology like face detection and thus it's only natural to think that people would have reservations and concerns about this type of technology and in particular about the development of this new passive metering device. Also, there were noted concerns with privacy, overall lack of trust, and concerns with the use of facial recognition technology in homes among Hispanic – Spanish Dominant, African American, Asian, and households with children. Given past research and knowing the device's functionality in how it "counts" faces by using infrared technology; it was determined that an assessment was needed to gauge the public's general acceptance of this metering device. A series of household focus group interviews were conducted across the US (Tampa, New York City, Los Angeles and Chicago) to gather base level insights and assess the public acceptance of this type of technology as a new method of collecting television viewing.

2.1 Focus Groups
Over 40 non-Nielsen households over a four week period in four cities (Tampa, Los Angeles, New York and Chicago) were interviewed to assess their personal opinions about this passive metering device.[2] Focus group participants were carefully selected to ensure that the sample participants met specific requirements with respect to gender age, household size, presence of children and ethnicity to insure that specific types of families were recruited for the focus groups especially those who were known to express more concerns with privacy, lack of trust and reservations with facial recognition technology (i.e., Hispanics—Spanish dominant, African Americans, Asians and households with children).[3] Table 1 provides a demographic overview of the families that participated in the focus groups. Each family was provided a non-contingent cash incentive after completion of the interview ($150 per couple / family and additional $25 - $50 incentive per child).

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[1] Currently, with the current methodology (i.e., of logging in and logging out) household panel participants are very good at this task--90.5% accurate (Nielsen, 2009). Despite the high compliance noted, there are continued opportunities to improve on this percentage—with larger audience size, with Hispanics, with children, when visitors are present and situations when participants are multi-tasking.

[2] In Tampa and New York there were 10 families interviewed and 11 families in Los Angeles and Chicago respectively.

[3] Focus group interviews were facilitated in both English and Spanish.

At the onset, families were provided a description with how the device worked and how it worked in conjunction with the more traditional device (i.e., button pushing device). Then participants were asked a series of questions to: 1) assess their level of comfort with the technology, 2) whether or not they would accept it in their homes, 3) what they would need from us to willingly accept it in their home (i.e., types of information or disclosures needed about the technology), and 4) lastly questions were asked about facial recognition technology and its acceptance. The purpose of these focus groups was to conduct an initial directional assessment of public acceptance of this type of people counting technology as a means to count the number of people watching television in a home environment.

Table 1. Household Demographics of Family Focus Group Participants

	White	African American	Asian	Hispanic (Spanish)	Hispanic (English)	Total
Head of Household, Gender						
Female	5	7	2	5	4	23
Male	9	4	2	5	1	21
Head of Household, Age						
18-23	1	1	1	1		4
24-34	6	5		3	3	17
35-49	4	4	2	5	2	17
50+	3	1	1	1		6
Household Family Size						
2	6	1	1	3		11
3-4	4	7	2	5	3	21
5+	4	3	1	2	2	12

Note: Totals depicted in table reflect not only household participants interviewed in Tampa, New York City, Chicago and Los Angeles but also includes interviews conducted with exiting television panel homes (n = 3).

3.0 Results

3.1 Understanding the Research Purpose & Acceptance
In the focus groups, though there were some expressed concerns about the passive metering device (i.e., thoughts that the device was a camera, not fully trusting that images were not stored or transmitted, not wanting people outside their home to know what they watch), a key component for a household's acceptance of this technology was a basic understanding of how their "count" data would be used and by "whom". Household members who were reluctant or skeptical at first were more amenable to having this device when they understood that the information collected would be used for TV ratings purposes. In some cases, prior knowledge of the Nielsen brand, its history and reputation helped add legitimacy and credibility to the research and this device.

3.2 Required Documentation & Acceptance
Once households understood the research purpose and how the device counted the number of people, nearly two thirds of the households said that it was important to have written

documentation about what the device did and did not do. Several households stated that having the explanation in writing would serve as a formal guarantee to the verbal explanation given by the company conducting the research. In fact, when the focus group facilitator provided a full description of how the device "counted" people it helped to reduced confusion and increased the overall acceptance of the device (i.e., used infrared light; detected features like eyes, mouths and nose; used of software trained on anonymous faces to determine if a face has been detected; and noted that individual faces were not recognized or identified; and only count data was stored).

3.3 Device Acceptance

Findings from the focus groups indicated that the majority of the households across all demographics groups and regardless of where they lived in the U.S. were willing to have this passive counting technology in at least one room in their home where the main viewing occurred. Lastly, participants indicated their preference for a smaller and less noticeable device over a larger more noticeable device design. As long as families were provided with information on how it worked, what data was collected and how the data was stored and transferred, they were accepting to have it in their home.

3.4 Acceptance of Facial Recognition Technology

Though the device described here in the family focus groups operated by counting the number of people in front of the television and did not use facial recognition technology, families were asked their thoughts about facial recognition technology. And lastly, their willingness to have this type of technology in their home to measure television viewing. Surprising, over half of the households were willing to have facial recognition technology in their home to measure television viewing. This type of technology was seen as less burdensome and more accurate when compared to the traditional button pushing technology. However, the majority of the homes willing to have this technology in their homes said that they would require additional and more explicit documentation stating the privacy and security of their images, in addition to the written explanation of how it worked.

4.0 Discussion

4.1 Lessons Learned from Focus Groups

As anticipated, families expressed some degree of reservation when the counting technology was first introduced to them. But after an explanation of what it did, the type of data that's collected and the overall purpose of the research, families were more accepting to have this device in their home to measure their television viewing behaviors. It is important to note that this idea of "full disclosure" to families about the device and describing all the technical aspects of how it operates is contrary to our initial thoughts prior to conducting the focus groups. We theorized that the acceptance of this type of passive device would be dependent on describing the device and it's functionality at a very high level in how the device operates and to avoid the technical engineering description when describing this device. In fact, quickly after one day of qualitative focus groups, families articulated the exact opposite. That is, interviewed families inquired and wanted more detailed information on how the device functioned and "counted" the number of people in the room. Also, findings from subsequent focus groups in other cities confirmed this finding. In summary, a majority of household focus group participants indicated that they were willing to have the counting device in at least one room in their home. However it's important to note that households were accepting of this type of technology as long as they were provided with a detailed explanation of how the device worked, what was stored on the device and what was transmitted back to Nielsen.

4.2 Leveraging Lessons Learned in Recruitment Materials & Strategies
Qualitative information gathered from the focus groups were used to develop recruitment and communication strategies specific to this device. The findings from the focus group shaped the types of recruitment materials and communication strategies that were used to best describe this new passive collection methodology while simultaneously increasing its acceptance. More specifically, the household materials including a privacy notice and panel agreement were devised with specific descriptions about the functionality of the device in that it would: 1) only transmit count data and not send back images of those watching television, and 2) not store images of the faces it counted. In addition, a document was created to leave with families which explained in detail how images were captured, processed and how counts were generated and lastly there was a section of frequently asked questions. All these specific materials were created in preparation for the recruitment of 100 existing panel homes to ask them to allow this device in their homes and to be used with the button pushing metering device that's already in their home.[4]

4.3 Recruitment of 100 Panel Homes for Passive Metering Device
For the field test, the goal was to install devices in 100 existing test panel homes. Field representatives attended a 2-day training class prior to start of recruitment and device installation. At the training, field representatives also shared our initial reluctance and concerns of providing a detailed "technical" description (i.e., infrared sensors) of how the device counted number of people. So it was equally important to share with them the importance of what was learned from the focus groups to ensure that the recruitment strategy put forth in the training was adopted by them and communicated appropriately to potential recruited homes.

Out of 100 households recruited, only four refused to participate. Although the results of this test cannot be used to project cooperation in deployment with newly recruited homes, insights were gained and proved encouraging. This metric alone suggests that the recruitment strategy deployed here was quite effective in gaining household acceptance and this was in large part due to the counterintuitive findings that were gathered from the qualitative family focus groups. In summary, a large majority of households were accepting and willing to have this type of technology in their homes.

4.4 Accuracy of Collection Tool
The 100 home test provided baseline data within a home environment to assess the 1) accuracy of the passive metering technology, and 2) to gain further insights on how this device could improve upon existing data collected via button pushing. As described earlier, the device is placed near the television and utilizes image sensors and infrared illuminators to count the number of people in its range.

The accuracy of the passive metering device was assessed by comparing count data from the passive device with data captured when participants actively pushed their assigned buttons on the other meter and through weekly inquiry calls.[5] The passive metering device was not as accurate in counting the number of people compared to the meter that required active button pushing. This discrepancy noted here is likely attributable to the nature of the device only having the ability to

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[4] Households that were approach and recruited to keep this new passive device are already part of an existing "test" panel where the expectation of being part of the panel is that from time to time they'll be asked to test new devices / methodology approaches as part of their panel participation.
[5] A total of 86 completed inquiry calls were made. During these calls, data were collected pertaining to the number of people watching/listening and looking at the TV during time of call. Then the call data was matched up and compared to the data collected by the passive metering device (Nielsen, 2010).

count the number of people directly facing the television and within the acceptable range of the device (i.e., distance of 10 feet). Also, normal television viewing behavior often does not consist of people exclusively watching television (i.e., often times people multi-tasking while watching television, may not look directly at the television etc.). All these factors were thought to impact the accuracy of the device to count the number of people in front of the television and resulted in a lower accuracy percentage. From an improvement perspective, there are opportunities to further develop this device through technology and algorithm enhancements (i.e., process involved in how the device counts the number of people). These areas of improvement to further mature the device are being investigated.

4.5 Overall Recruitment Techniques and Best Practices

As noted from the focus groups and successful recruitment of homes, as best practices it important to explain the purpose of the device and its benefits for the household through household materials, providing additional reassurance through privacy notices and panel agreements. [6] And for those who are not as familiar with the purpose of the research or the entity that is conducting the research, it's even more important (or best practice) to provide more information about the research company with focus on the company's reputation, credibility and legitimacy to establish a relationship of trust with potentially recruited homes. Lastly, in theory a device like this could be used to further improve the data quality that's collected today in the television measurement industry. For example, any discrepancy noted between the two devices (i.e., passive and button pushing methodology) can provide "coaching" opportunities to encourage participants to log in and log out when they should. For now, it's envisioned that this passive metering device could be used to supplement the traditional (existing) data collection methods.

References

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[6] Some participants in focus groups also indicated that providing a demonstration of how the device scans images, processes data and delivers count would be useful in gaining their acceptance of the device.