

June 2008

The Efficacy of Accommodating Deaf and Hard-of-Hearing Employees in the Workplace via Note Taking

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Balsamo, Linda M. (2008) "The Efficacy of Accommodating Deaf and Hard-of-Hearing Employees in the Workplace via Note Taking," *Journal of the North American Management Society*. Vol. 2: No. 1, Article 3. Available at: <https://thekeep.eiu.edu/jnams/vol2/iss1/3>

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Journal of the North American Management Society

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The Efficacy of Accommodating Deaf and Hard-of-Hearing Employees in the Workplace via Note Taking

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Abstract: Deaf and hard-of-hearing employees often find it difficult to learn about important information, which is disseminated informally in their employing organizations. The purpose of this study was to examine information, which is impromptu or short in duration, that is transcribed by note takers. It examined the quality of the note taking both in quantity and content. The participants included 65 individuals with varying levels of contact with deaf and hard-of-hearing co-workers. Results indicated that note takers attend to verbal messages more than to textual or visual messages. Note takers tend to prioritize messages and transcribe those with a higher perceived level of meaning given the temporal limitations present. Participants transcribed accurately or modified an average of 33 semantic units out of a possible 237 (14%). Participant transcriptions using a conceptually broader scoring method based on themes averaged 17 themes out of a possible 25 (68%). Study results provide organizational managers with additional information when making decisions regarding accommodations for their deaf or hard-of-hearing employees.

INTRODUCTION

Formal and informal channels of communication may become blurred for deaf and hard-of-hearing employees. This is often due, in part, to the pragmatics of disseminating information (Foster 1992). The Americans with Disabilities Act (ADA) requires that, when necessary and appropriate, large employers must provide the accommodations that are necessary to ensure all employees have equal access to information (Department of Labor 1992). While most companies attempt to comply with this mandate, impromptu staff meetings and other less formal gatherings often occur without sufficient notice to bring in a certified interpreter for deaf employee (Scherich Apr/May/June 1996) or to provide word-for-word transcriptions for late-deafened employees. Often, the deaf and hard-of-hearing employee receives the information from a co-worker through note taking, either asynchronously or at a later time.

The purpose of this study was to determine whether the meaning of an original message sent within an organizational context is adequately conveyed when hearing people are used as note takers to transcribe short impromptu meetings or demonstrations. The effects of the dynamics of the act of transcribing (i.e. temporal issues, social exchange aspects, experience working with deaf people, and language barriers) have already been established (see S. Foster, (1992); Glass & Elliott (Fall 1993); Hetu & Getty (Fall 1993); Mowry & Anderson (Fall 1993); Scherich (Apr/May/June 1996); Schroedel, Mowry & Anderson (1994)). This study expanded upon these aspects and attempted to capture information regarding written transcription and its efficacy for translating meaning. Having equal access for deaf and hard-of-hearing employees to information (an ADA requirement) was essentially the ultimate intent of this exploration.

Considering the ADA requirement that all employees have equal access to information in the workplace, does the deaf or hard-of-hearing employee truly have equal access to information when that information is received in written English in the form of note taking by a co-worker? One could argue that there are indeed levels of access, some more adequate in certain situations than in others and often vary depending on management's idea of what is deemed reasonable and the employee's needs. For instance, formal meetings in large group settings would most likely mandate the use of a certified interpreter or simultaneous closed captioning. Benefit information might lend itself to a written form, giving the

employee an opportunity to ask for clarification if necessary. A video presentation to the general work population might lend itself to closed captioning as a means of accommodating deaf and hard-of-hearing individuals. Training might be accomplished through visual demonstrations, supplemented with written instructions. In all these cases, the judgment of the manager and needs of the employee must be assessed to determine what is appropriate for the situation. Very often, the most pragmatic solution is to have a co-worker transcribe a verbal message into written English while the message is being presented. The nature of this type of transcription often demands that decisions be made with regard to what is produced on the written page. One must consider that a co-worker's ability to actively participate in the group process may diminish as they listen to a verbal message and transcribe the message into written form while listening to the next portion of the verbal message. This can be a demanding task for some, impossible for others.

Departmental staff meetings are common forums utilized to disseminate both formal and informal information in the workplace. These meetings are also the most likely situation where misunderstandings may occur for deaf and hard-of-hearing employees who may not hear all the information being presented. The use of a certified interpreter would appear to be an ideal accommodation for a deaf employee. However, hiring a certified interpreter is often foregone for a variety of reasons. Hard-of-hearing employees who do not know sign language do not have the option of using a sign language interpreter, regardless of whether one is available. The actual impact of this situation has not been measured on either the deaf or hard-of-hearing employee or on the hearing co-worker who is asked to transcribe. In fact, the deaf or hard-of-hearing employee may not even be aware that they may be missing information.

This study examined the information that is passed from a hearing co-worker, who is acting in the role of transcriber, to his or her deaf or hard-of-hearing co-worker during a videotaped demonstration. Content analysis was used to examine the material that was transcribed to the written page to determine if the meaning of the original message was adequately conveyed in written form.

BACKGROUND

Temporal Aspects of Conveying Meaning

Much of the research (Crampton, Hodge, & Mishra Winter 1998; Kurland & Pelled Apr 2000; Monge & Eisenberg 1987; Nelson 2001; Young Fall 1998) on informal communication uses common adjectives and adverbs to describe the unique aspects of this form of communication. They include: dynamic, face-to-face, discretionary, lacking hierarchy, off the record, unregulated or uncontrollable, fluid, spontaneous, and fast. Given these descriptors, the very idea of purposefully interjecting an interpretation in the midst of the flow of information has the potential to create a great deal of dissonance for the hearing co-worker. They are simultaneously challenged with the task of interpreting or transcribing a message on behalf of the deaf or hard-of-hearing employee while maintaining his or her own participation in the dialog. Not only is the temporal flow of information disrupted, the hearing employee faces the prospect of partially removing him or herself from the stream of communication by their very intervention. This important concept suggests a major reason informal communication in the workplace often fails or is less than adequate for deaf and hard-of-hearing employees compared to formal communication (Foster 1992). Goffman (1981) suggests that during verbal interaction, norms regarding interruptions, simultaneous talk and withholding answers help facilitate the smooth flow of information. When the flow is punctuated by the act of interpreting or transcribing, these norms are disrupted – that is unless interpreting and transcribing has become part of the norm. Despite this possibility, the interjection of interpreting into the conversation alters the dynamics of the exchange for both the interpreter and the deaf employee.

Bridging the Gap of Access to Informal Networks

Deaf employees who sign often report feelings of isolation when they work in environments where the primary language is English (or some other spoken language) (Foster July 1987; Glass & Elliott Fall 1993). When we consider the different means of disseminating formal versus informal information in the

workplace, it is not surprising to learn that deaf employees are generally more successful at accessing formal rather than informal information (Foster 1992). It is not unusual for vital information that readily flows through the informal communication network not to reach deaf and hard-of-hearing employees, furthering his or her feelings of isolation and promoting feelings of anger and resentment. Having access to informal communication in the workplace is vital to employee well being, especially when dealing with a highly stigmatized condition such as hearing loss.

Despite the best efforts of the hearing co-worker acting as interpreter or transcriber, the information emanating from the informal communication network still may not reach the deaf or hard-of-hearing employee. The information that does reach the employee may be colored by the choices the hearing co-worker makes as to the way they convey the message and the verbiage he or she chooses to use. The role of interpreting or transcribing places the information source (a single person or group of people), the hearing co-worker who is accommodating the deaf or hard-of-hearing employee, and the deaf or hard-of-hearing employee in an interactive discourse that is heavily weighed by the interpreter or transcriber's influence on the way he or she translates meaning. A variety of factors influence the message that is sent and received including the language used; the tempo of the original message; whether there is a disconnect between the original message, the interpreter's personal style, and the requirements needed to accomplish the task of interpreting; conscious and subconscious decisions regarding what is important and what can be discarded; and the determination of what is in the best interest of the interpreter and in the best interest of the deaf or hard-of-hearing co-worker, which may conflict. A tension may exist between an interpreter or transcriber's desire to help his or her co-worker by accommodating the employee and the interpreter or transcriber's desire to be an active part of the discourse. During the act of interpreting or transcribing, the hearing co-worker must momentarily step back from active participation in the exchange of information.

Departmental meetings are a common activity in most organizations. During departmental meetings, the informal and impromptu nature of the meeting often makes hiring an interpreter impractical. The timing or duration of the meeting often preempts the amount of time it takes to schedule or expense of hiring an interpreter to accommodate deaf or hard-of-hearing employees. This situation also has the potential to limit a hard-of-hearing employee's access to all the information being disseminated. This scenario is an ideal setting to be studied due to the relatively high frequency in which departmental meetings occur and their common use to disseminate informal information in a top-down fashion. The different types of information that are disseminated constitute part of the decision-making process to determine whether a certified interpreter would be appropriate during informal meetings in the workplace. Anecdotally, it has long been assumed that using a co-worker instead of a certified interpreter to accommodate the deaf or hard-of-hearing employee puts the employee at a very distinct disadvantage to his or her hearing co-workers in terms of the nature, extent and accuracy of the information the employee receives.

Temporal Flow

One of the reasons for the less than desirable results of interpreting informal information by a hearing co-worker may lie in the very nature of informal communication networks. This is because the very act of interpreting by a hearing co-worker disrupts the flow of information, slows it down, and removes some of the spontaneity of the thought process. Not only does the flow become "unnatural" for the deaf or hard-of-hearing employee, this is also the case for the hearing co-worker who is interpreting or transcribing. For instance, while the hearing co-worker is engaged in the act of transcribing, he or she may find that they are temporarily disconnected from the conversation. Re-establishing participation in the conversation is not an impossible task but requires an effort that may quickly become tiresome. While the deaf or hard-of-hearing employee may be grateful for the disruption in that, as flawed as it may be, the disruption has provided them access to the information exchange, the hearing co-worker may feel conflicted by the level of dissonance the disruption can create.

Hall (1989) argues that there is a highly patterned hidden level of culture with unspoken, implicit rules of behavior and thought that controls everything we do. Conversations in any language have a tempo. Entraining yourself (synchronizing rhythms) to this tempo is critical to the group process. Bluedorn (2002) makes the claim that entrainment is necessary to achieve at least a minimal level of organizational functioning and effectiveness. Who has not felt the dissonance created by the disruption of the tempo of a comic's routine by a heckler or the lack of timing in a punch line? Another example might be the desire to silence a co-worker who constantly interrupts a group meeting. Hall is convinced that few people can function outside the narrow limits of their own rhythm system. There is a tendency to deliberately attempt a calibration of the two different systems and bring them in phase.

Add to this the idea that conversations tend to be monochronic – that is, they are linear. One idea follows another and once it is conveyed, turning back to convey ideas already verbalized throws off the tempo of the conversation. Given that human nature tends to minimize interruptions that inhibit the natural flow or rhythm of information, we can begin to understand why the act of transcribing runs contrary to this norm.

The temporal flow plays a key role in the length and depth of most conversations. The same may be true for hearing co-workers transcribing informal information in the workplace. The dissonance felt by the hearing person due to the unnatural temporal flow of information may prompt a shorter transcription of the original message. The truncation of the message may also be an unconscious attempt to minimize the loss of the hearing co-worker's own participation within the informal communication discourse.

CONCEPTUAL FRAMEWORK

The complex nature of the workplace demands several theoretical frames. On the surface, Blau's (2003) social exchange theory helps describe the economics of the act of interpreting or transcribing, regardless of whether it is done willingly or because it is assigned by a manager. Aspects of entrainment, tempo, flow, communication norms, and decision processes regarding what to write down and how to convey meaning all play a role in what the hearing co-worker puts on the written page. Setting language barriers aside for the moment, what is written directly impacts what is understood by the deaf or hard-of-hearing co-worker.

Social Exchange Theory

Blau (2003) defines social exchange as the “voluntary actions of individuals that are motivated by the returns they are expected to bring and typically do, in fact, bring from others” (p. 91). The relationship between the deaf or hard-of-hearing employee and their hearing co-workers develops within a larger social environment where other relationships both cause and affect the processes within the social system (Scanzoni 1979). Social exchange theory posits that close relationships, whether referring to friendship, kinship, or intimate relationship, are characterized by high interdependency (Huston & Burgess 1979; Scanzoni 1979). There is an assumption that social interests are anchored in self-interest and that social exchange always entails elements of both intrinsic and extrinsic importance for the participants (Blau, 2003).

Social exchange theory proclaims that an individual will do a “favor” for another with the expectation that the favor will be reciprocated in the near future (Blau 2003). And if it is not and the relationship becomes “one-sided”, the individual who feels the inequity will try to restore the equity (Scanzoni 1979) or the attachment will eventually dissolve. However, Blau (2003) also states that a person may obtain social rewards from a co-worker without incurring an obligation to reciprocate. Rather than obtain some extrinsic reward for their actions, the act itself can be considered a net gain as opposed to a net cost. A co-worker of a deaf or hard-of-hearing employee may be assigned the task of transcribing by his or her manager or he or she may volunteer. If the co-worker is asked to do this often and is not doing so voluntarily, feelings of inequity may develop over time particularly if the task is not shared equally among the rest of the hearing co-workers within the group. However, the reward may be in pleasing the

manager by doing what is asked. For those who volunteer, the action may be rewarding enough to motivate its continuation. The fact that equity can be obtained through the act itself implies a more complex situation than merely quid-pro-quo.

In an actual office situation, the deaf or hard-of-hearing and hearing co-workers would normally have some sort of working relationship. They may have been co-workers for days or years. They may be friends with an affinity towards each other or they may not like each other at all. For whatever reason, the manager may think he or she is assigning the task to the appropriate person or the assignment may be random. Some individuals might take the assignment seriously and do their utmost to transcribe to the best of their ability. Some may not and do as little as they think they can get away with without incurring the wrath of their manager. Each of these behaviors incurs benefits and costs. The equity the employee seeks will be determined by what the employee values and is unique to each individual.

Temporal Norms

The hearing co-worker, naturally, has a desire to be part of the discourse. In fact, they have a vested interest in paying attention since some of the information may pertain to them. They may also have a desire to transcribe well either for the benefit of their co-worker or because his or her manager would approve. They may be able to do both at a level that is satisfactory to everyone involved. Or they may not be able to do both at the same time, in which case choices throughout the discourse need to be made.

The tempo of the discourse plays a key role in what is transcribed and the way the meaning is conveyed. Goffman (1981) argued that norms exist that help facilitate the smooth flow of information which may include unwritten rules about interruptions, even if clarification is needed. Hall (1989) takes this further by adding that our culture is “highly patterned” with unspoken, implicit rules of behavior. He noted that each person has his or her own rhythm that each tries to calibrate to the system he or she is presently in. Sometimes we are successful and sometimes we are not. When the latter occurs, dissonance is felt. Similar to Hall, Bluedorn (2002) describes communication as highly entrained, with a tempo and flow that does not feel right when it is disrupted.

These everyday aspects of communication are punctuated when the act of transcribing comes into play. It does not matter if the person asked to accommodate the deaf or hard-of-hearing employee is highly trained or is a layperson. Both need to cope with the tempo, flow, and entrainment aspects of communication. Paraphrasing often becomes necessary in an effort to keep up with the discourse. Some individuals may not be good at writing and listening at the same time. The transcriber may be interrupted by the deaf or hard-of-hearing co-worker when clarification is needed. This momentary absence from the discourse might prove difficult to recover from as they try to entrain themselves back into the flow of information. They may even lag in their level of transcription due to an overwhelming interest in the information they are listening to, fatigue, or forgetfulness regarding the duty they have been assigned. All these possibilities have the potential to affect what is transcribed, including the language used to convey meaning and, consequently, what is ultimately understood by the deaf or hard-of-hearing employee.

While the temporal aspects of communication may force choices regarding what is conveyed by the hearing co-worker and how the meaning is conveyed, personal choice also comes into play. What one person thinks is important may not be the same as what someone else thinks. When we are forced to choose to convey one thing over another, we each bring a unique decision-making process to the table. Unfortunately, the deaf or hard-of-hearing employee is at the mercy of his or her co-worker and must assume that what is being conveyed accurately reflects the original message.

The verbal English speech is being transcribed to written English so we will be able to examine the meaning behind the original message and the transcription. Whether or not the two messages are similar greatly impacts whether the deaf or hard-of-hearing employee has equal access to the same information his or her hearing co-workers do.

In this study, meaning may be different for the researcher, the participant, and the deaf or hard-of-hearing co-worker who is relying on the transcription both in terms of the conceptual meaning as well as the translation they may need to make from written English to their primary language of American Sign

Language (ASL). This study eliminates the variability of the deaf co-worker by not including their understanding of the meaning of the transcription. This leaves the meaning inferred by the researcher and the participant. To make this an easier process, the text is segmented into semantic units or propositions.

Unit of Measurement

The unit of measurement used in this study is a semantic unit. While the definition of a semantic unit varies depending on the application, what is critical to the analysis is consistency across coders. To accomplish this goal the researcher must remove as much of the ambiguity as possible. One way to do this is to clarify the definition of the variables used to quantify the accuracy of the semantic unit. Cokely (1992) draws on previous work done by Barik (1971) describing the omissions, additions, and errors present during simultaneous interpretation and applies them to his basic socio-linguistic model in which a target language message may deviate from a source language message. He calls these “miscues” and they include omissions, additions, substitutions, intrusions, and anomalies. Cokely used these deviations in a slightly different way than is needed for this study. The source language and target language (translation) in Cokely’s study were two different languages making intrusions and anomalies a necessary deviation choice. In the present study, the target language and source language are the same. The remaining three deviations defined by Cokely (and are similar to Barik) are Omissions, Additions and Substitutions.

Cokely (1992) computed the error rate for each person being studied nominally. Each miscue is counted as a single unit and then totaled for each participant being measured. He then provided a percentage for each type of miscue based on the total number of miscues. Barik (1971), on the other hand, quantified the number and, consequently, percentage of omissions, additions and substitutions per 100 words to arrive at a rating for each interpreter. While each of these methods provides an objective measure for evaluating an interpreter’s accuracy, their use as a means of calculating the error rate is not exactly appropriate for the current study. The present study adapted these two methods by taking advantage of whole sentence structure in arriving at the meaning of the transcription.

The present study attempts to measure a transcribed message from verbal English to written English. In the case of note taking as a means of accommodation, a transcription is the only product available for study, making an objective as opposed to a subjective measurement applicable.

METHODS

Drawing on the variables Cokely (1992) identified as having a direct impact on the quality of an interpretation, the study recorded and examined the kind of information passed from a hearing participant acting in the role of interpreter (using transcription methods) to a deaf or hard-of-hearing person via written English during a videotaped presentation. The meaning of the transcriptions was examined and compared to the original message’s meaning to determine its accuracy.

Each of 68 participants viewed a 13-minute prerecorded video presentation (Three participants were eventually removed as outliers leaving a sample size of 65 participants.). The subject matter of the video focused on the actions required in the event of a robbery in a retail store. The video was recorded using actors communicating in verbal English. The video was an actual training presentation that had been made to company employees in the past. The video was chosen because of its similarity to a short meeting that might not lend itself to hiring an interpreter due to its length.

Data Collection Instrument

The first measurement instrument was a modified version of one Strong and Rudser (1985) designed at the University of California’s Center on Deafness. The instrument was developed to provide an objective assessment of sign language interpreters. The instrument was based on prior the research conducted by Barik (1971) and modified by Cokely (1992) discussed earlier. The current instrument modifies the Strong and Rudser method because the current study is based on note taking, not interpreter

accuracy which was the focus of the Strong and Rudser method. The current version used in this study focuses on dividing the stimulus text (or verbal message) into “propositions” containing single semantic ideas.

The response text (written transcription) was also divided into propositions and the two were compared. The initial assessment determined whether the proposition was accurate, inaccurate, modified or missing. If the proposition was modified, then further assessment was used to determine whether the modification included one or more substitutions, additions or omissions. For more detailed information on the scoring method, see full dissertation (Balsamo 2006).

RESULTS

Research Question 1 Results

The first research question asked was:

RQ1: *What type of information is transcribed by a hearing participant during a verbal English staged video presentation in a workplace setting?*

Several observations could be made by analyzing the transcriptions about the process of note taking. The video contained some unique characteristics that help shed some light on what the participants attended to and what they did not. The term “attended to” is used to indicate what the participants transcribed as an indication of what they read, heard, or saw. It is quite possible to attend to two or more modes of communication and only transcribe one. It is assumed that what was transcribed was attended to at a higher level than what was not transcribed.

First the mode of communication used in the video was examined to determine whether participants attended to the verbal, textual and/or visual messages conveyed. Further analysis was done to determine if there was a trend from beginning to end in the level of transcription rate. Finally, the content of the propositions was examined to determine if those propositions that were transcribed the most and the least differed in terms of perceived importance to the participants.

Mode of Communication Transcribed

The mode of communication in the video was primarily verbal. However, throughout the video, *textual* messages reinforced the verbal messages by being displayed on the screen while the verbal message was being presented. At other points during the video, *visual* examples were used to reinforce the verbal message by showing the participant how to display certain behaviors.

In some instances, the words used in the verbal message were not exactly the same as the words used in the textual message. The words chosen for use in the transcription indicate which mode of communication was attended to the most during the presentation. Table 1 outlines the results of this analysis. As noted, the verbal message is transcribed at a significantly higher rate than the textual message. Although there are only three instances where verbal and textual messages varied, these instances give us a glimpse into whether the participant attends to the verbal message or the textual message by examining the terms used in the transcription. These results would support the notion that the verbal message was attended to more often than the textual message. In fact, anecdotal evidence from participant comments after data collection was complete supports these results. Quite a few participants commented that note taking was difficult under any circumstance and in many instances did not afford the opportunity to watch the video to see the textual messages.

Another mode of communication that was used in addition to the verbal message included *visual* examples that served to reinforce the *verbal* message. On three occasions, role-playing was used to demonstrate techniques that should be used during a robbery. The first instance of role-play was indicated in the transcriptions by 16 of the 65 participants (25%). The second role-play incident was indicated by 3

participants (5%) and the third by 4 participants (6%). This would indicate that visual examples that serve to reinforce verbal messages are not attended to during note taking. In other words, participants may watch the visual message, but rarely does the message end up in some form on the written page. There does not seem to be any indication as to why the instance of the first role-play was transcribed at a much higher rate than the second two.

TABLE 1
RESULTS OF MODE OF COMMUNICATION ATTENDED TO BY PARTICIPANTS

	Message Attended to			
	Verbal	Textual	Other	No Transcription
Proposition 53	20%	15%	27%	38%
Proposition 54	71%	7.5%	7.5%	14%
Proposition 111	40%	29%	3%	28%

Transcription Rate From Beginning to End

Due to the relative difference in size between the introduction, body and concluding section, it seemed appropriate to segment the propositions into equal parts analyze the transcriptions to see if a trend in transcription rate existed. When the propositions were segmented into 10 equal segments, it became very clear that no trend existed as the video progresses from beginning to end. By examining when the transcription rates rise and fall, we are able to see what may have been impacting them. When the propositions were sorted by transcription rate from high to low, nearly all of those that were transcribed by more than 50% of the participants were defined as primary propositions used to identify themes for the thematic scoring method used later in this study.

Despite the assumption that writing fatigue may impact the transcription rate as we move from beginning to end, an overriding factor seems to be the decision-making process of transcribing primary propositions regardless of whether the task is at the beginning, middle or end of the time continuum. Based on these results, there is no decreasing trend from beginning to end.

Transcription of Proposition Content

The actual content of the top 5% of the propositions that were transcribed and the bottom 5% of the propositions was examined. In doing so, one can understand the decision-making process participants go through during the note taking process. It is virtually impossible for an individual to transcribe every proposition, even if done so with modifications. At some point, a complex decision must be made whether the proposition holds enough saliency to warrant an attempt to transcribe it given the temporal realities that are present. Time frames differ throughout the presentation. Pauses and duplicate propositions provide temporal breaks in the flow of information. At the same time, the transcribing process (i.e. the act of writing) may interfere with the act of listening (or reading or observing), causing time frames to overlap.

By counting the number of participants who transcribed a particular proposition, we can rank their order from highest to lowest. In the case of the bottom 5%, 41 propositions (17.3%) were not transcribed by any of the participants. The data suggest that there is a qualitative difference in the content of the top and bottom 5% of the transcriptions. The top 5% of the transcriptions contain message content that seem more germane to the video topic than the bottom 5%. The top 5% could be characterized as “bullet point” items that could serve to outline the topic in question. These might also be characterized as “primary messages”. In fact, 10 of the top 12 propositions are directly related to one of the 25 themes developed for the thematic scoring method used later in this study. These themes are broader in meaning than the

propositions themselves and often span more than one proposition. However, the broad characteristics of the thematic units limit the amount of context that can be associated with the theme.

The bottom 5% of the propositions can be characterized as “secondary messages” that add depth and context to the primary messages. These messages aid in creating a smooth transition from one theme to the next with an increased understanding of the main message point (i.e. bullet point). It seems that when a decision was made to transcribe a proposition, three factors may have come into play. Aside from the factor that a participant may have simply choose not to transcribe a message, he or she may have made a judgment as to the importance of the proposition to the overall subject matter of the presentation.

A secondary consideration, which may override the “importance” factor, is the temporal aspects in play at the time the proposition was stated. If there is a temporal break in the message, secondary messages were sometimes transcribed until a primary message takes precedence. The temporal aspects of the task of note taking can interfere with the completion of the proposition. One proposition was started and documented until another more important message was heard, causing the participant to halt the first and transcribe the second.

Research Question 2 Results

The second research question asked was:

RQ2: How accurate is the transcription by a hearing participant from a verbal English staged video presentation to written English in a workplace setting?

This question was analyzed from several directions. The concept of accuracy varies depending on the definition used. In this study, accuracy was defined in three ways. At the most basic level, accuracy is measured as the number of transcribed propositions. A second method, and somewhat less mechanical measure, would include some measure for errors as defined in S & R’s method of scoring. Finally, a third measure can be achieved at a thematic level, which takes into account meaning at a broader level, but loses some specificity that is present using the S & R method.

Accuracy by Proposition Count

The maximum number of propositions in this study was 237. Each proposition represented a semantic unit derived from the original script of the video. One can compute the average number of propositions that were transcribed by the participants to ascertain a percentage of the total number of propositions. Here, the average number of transcribed propositions was 37.03 or 15.62%. This calculation includes propositions that were transcribed accurately, inaccurately, or modified in some way (Table 2). As noted in Table 3, some of the transcribed propositions were inaccurate. If these are removed, the total propositions that were transcribed accurately or modified in some way is reduced to 14.79%.

TABLE 2
Accuracy Based on Transcribed Proposition Results

	Accurate	Inaccurate	Modified	Total Transcribed	Missing	Total Propositions
Avg. Score	18.26	1.97	16.80	37.03	199.97	237
Percent	7.70%	0.83%	7.09%	15.62%	84.38%	100%

Accuracy by Strong and Rudser Scoring Method

The S & R method of scoring takes into account the number of errors present when a proposition was transcribed. These errors were measured as a subset under the “modified” heading described above. The errors may include *substitutions*, *additions*, and *omissions*. An accurate transcription received a score of “10 points”. A proposition that was modified in some way had a point subtracted from 10 for each error that was made. The composite score is a reflection of the quantity and quality of the transcription as measured against the original script.

The maximum number of points that could be scored using the S & R method was 2,370 (10 points each for 237 propositions). Each proposition is given equal weight regardless of its perceived significance. The participants in this study averaged 327.88 points or 13.83%. Table 3 illustrates the errors made and their average frequency. Note that the total error percentage is the difference between accurate and modified transcription count percentage and the average S & R method score. The frequency distribution for the total score using the S & R scoring method follows a normal curve with all the results falling within 2.396 standard deviations from the mean.

TABLE 3
ACCURACY USING STRONG AND RUDSER’S SCORING METHOD

Modified	Substitution	Addition	Omission	Total Errors	Average Score
16.8	5.02	2.12	15.6	22.74	327.88
7.09%	0.21%	0.09%	0.66%	0.96%	13.83%

Accuracy Based on Themes

Scores were calculated based on theme representation due to some concerns with the mechanical nature of the S & R scoring method. 25 themes were identified as germane to the video. Each participant’s transcription was read to determine whether each of the themes was present (1) or absent/incorrect (0) and scored accordingly. Then a total score was computed. The scoring for themes ranged from 0 to 25. The average score across all participants was 17.14 points (68.56%) with a standard deviation of 2.904.

The results above indicate three measures of accuracy and are representative of the amount and accuracy of information transcribed by hearing participants via note taking. The first two are based on transcriptions of propositions and the third based on transcriptions of thematic units. Accuracy based on accurate and modified proposition count averaged 14.79%. Accuracy based on the S & R scoring method averaged 13.83%. Accuracy based on thematic units averaged 68.56 %.

DISCUSSION OF FINDINGS

Type of Transcribed Information

The modes of communication that were examined included those that were verbal, textual and/or visual. Verbal messages seem to be attended to more often than either textual or visual messages. All of the participants were able to hear the presentation. Taking notes forces the participant to rely on all their senses to receive the message. In this case, they had the opportunity to view the screen for textual and visual messages as well as hear what was being said. For most people, writing requires looking at the page to accomplish the task legibly. Since the task at hand required that someone else (the deaf or hard-of-hearing co-worker) be able to read the transcription, some effort had to be made to make it legible. It is

logical to assume that the participant would rely on the sense of hearing over the other senses. In doing so, the participant is able to focus their effort on writing, resulting in a higher level of looking at the page instead of the video screen.

Based on the study results, writing fatigue can most likely be ruled out but there still might have been some initial enthusiasm that waned as time went on. There seems to be some decision-making process going on about what to write and what not to write. The proposition rate rises significantly whenever a primary proposition is present and falls whenever a secondary proposition is present. This would indicate that a decision is made to transcribe a proposition when it is perceived to be important by the participant.

The content of the transcriptions is critical to the overall level of understanding of the message for the deaf co-worker. Obviously, the more propositions that are transcribed accurately, the better. But some propositions seem to hold more saliency than others for the hearing participants. A decision process is in play as temporal realities interfere with one's ability to write a proposition. Participants seem to choose to transcribe primary or "bullet point" propositions over secondary propositions. Figure 1 illustrates a conceptual model of what might be happening during this decision process.

In Figure 1 the larger shapes represent the primary propositions or themes of the presentation. The pieces falling below the screen represent the secondary propositions. They also represent much of the context and details within the presentation. This is an important point to consider. Note taking is a means of accommodating deaf and hard-of-hearing people in the workplace. Note taking allows for a higher level of access to information. However, it does not translate to "equal access" that we strive for in the Americans with Disabilities Act. One can argue that note taking is a happy medium between the pre-planning required and cost of hiring a certified interpreter or arranging for real-time captioning for more informal and impromptu presentations. But for the deaf and hard-of-hearing employee, it does not represent equal access to information. When we transcribe the themes without the context, have we given the deaf employee all the information needed for job success? Does this put the deaf employee at a disadvantage to the hearing people working in the same office? These are hard questions to answer. Since we have not measured what the hearing participants have understood from their participation in the presentation compared to the deaf participant's understanding of the presentation from the transcription, we can only speculate that a disadvantage exists.

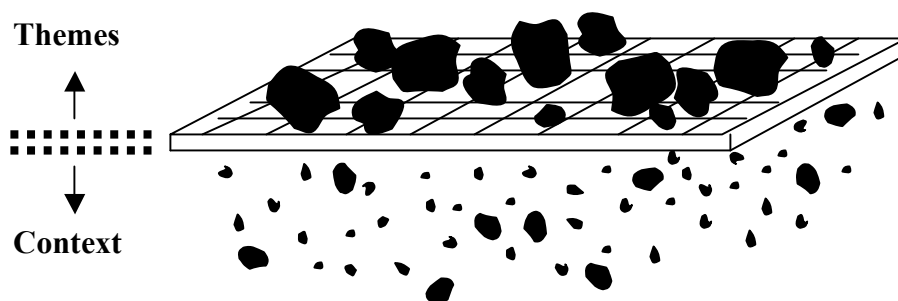


FIGURE 1
CONCEPTUAL DIAGRAM OF DECISION-MAKING PROCESS

Accuracy of Transcriptions

The second research question asks about the *accuracy* of transcribing. Accuracy in this study is measured in three different ways. Accuracy based on proposition count (those that were accurate or modified) measured 14.79%. This is a somewhat mechanical way of measuring accuracy in that each proposition is assigned the same weight regardless of perceived importance or errors made in transcribing.

The modified S & R method of scoring takes into account these errors and reduces the accuracy to 13.83%. Another way of looking at this is that 84.38% of the propositions are missing and have no representation in the transcription. While this figure may seem alarmingly high, this may not be the case when we consider the relative importance of each of the propositions to the participant.

The S & R method of scoring does not take into account any level of perceived importance of the propositions by the participant. What gets transcribed is a conscious decision as to its relative importance to other propositions given the temporal realities in play while the message is being conveyed. Given that decisions such as these are being made, we have to assume that not everything will be transcribed. In fact, it would not be possible for someone to transcribe even half of the propositions.

With this in mind, it seemed logical to go back to the original script to identify the major themes or primary propositions that a participant might perceive as being important enough to transcribe. In doing so, we have a third way of measuring the quality of the transcriptions. The average score across these 25 themes was 68.56%. This is a much higher score than the other two accuracy measurements. This is to be expected. The themes cast a wider net across multiple propositions so that the chance of a participant capturing it in their transcription is more likely. A participant has the potential to score very high using this method of scoring, but in the process may transcribe only part of the meaning and limit the level of understanding the deaf or hard-of-hearing co-worker achieves. The deaf or hard-of-hearing co-worker may understand at a very basic level what the proposition means, but may not be able to put it into the context of what to do during a robbery.

FUTURE RESEARCH

The end result of note taking lies not only in how much information a deaf or hard-of-hearing employee receives, but in how much they understand. Like the game where messages are relayed from person to person and the end message is far from the initial message in meaning, the same can be said about note taking. A hearing person has the opportunity to make judgments about the intended meaning. Misunderstandings may occur due to a poor message being conveyed or they may occur because of a lack of understanding on the part of the recipient. When note taking is used, the deaf or hard-of-hearing recipient not only has to contend with whether a good, concise message has been sent, the intermediary's understanding of the message must also be considered. In addition, temporal realities may interfere with the level of understanding and interfere with what makes it onto the page in written form.

Future research might include a post-test of the participants who simply view and listen to the presentation, those who take notes during the presentation, and those who read the transcriptions (the deaf and hard-of-hearing people) to see if one group has a higher level of understanding. Including both deaf and hard-of-hearing (including late-deafened adults) would provide an opportunity to control for language barriers (i.e. the primary language being sign language for most deaf people and English for most late-deafened people in the United States). Finally, given the significance of sign language skills on the transcription score, more research needs to be done on the knowledge of sign language as it relates to transcription accuracy. The difference may lie in the learning styles or specific profiles of signers.

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