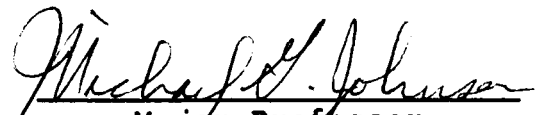


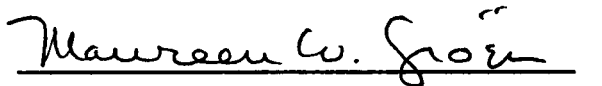
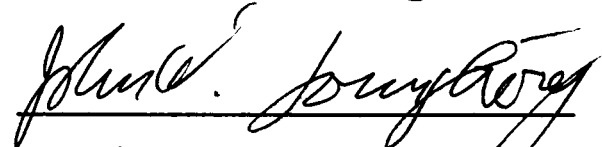
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To the Graduate Council:

I am submitting herewith a dissertation written by Patricia Bardill Hinton entitled "The Communication and Memory of Oral Instructions In A Medical Context: Patients' Memory for Physicians' Instructions." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Psychology.


Major Professor

We have read this dissertation
and recommend its acceptance:


Accepted for the Council:


Associate Vice Chancellor
and Dean of the Graduate
School

The Communication And Memory of Oral Instructions
In A Medical Context: Patients' Memory
For Physicians' Instructions

A Dissertation
Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

Patricia Bardill Hinton
December, 1992

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ABSTRACT

The communication and memory for oral medical instructions was examined in three studies. Study one involved two surveys, a survey of 200 Knoxville, TN, laypersons and a survey of 350 general practice/family physicians chosen at random from the physician directories of Knoxville, TN, Boston-Cambridge, MA, Chicago, IL, Seattle, WA, and Houston, TX. These surveys revealed that 96% of responding physicians and 47% of responding laypersons perceive that remembering and comprehending medical information is a serious problem. Study two was conducted in the University of TN student health clinic. Thirty-four volunteer student subjects recalled the medical instructions given during routine clinic visits either immediately or 3-4 days following their medical consultation. Overall recall of instructions was 57%, with no effect for gender, physician, or condition (delayed or immediate). Physicians primarily used repetition and lay terminology to reinforce their instructions. Study three involved a 3 X 2 design in which three methods of presenting medical instructions were given in both immediate and delayed recall conditions. The three presentation formats were traditional, repetition, and categorization. Subjects were 215 student volunteers from

undergraduate psychology classes at the University of TN. There was no effect for gender. Across all conditions, however, non-native English speakers had significantly less recall. In the immediate recall conditions, subjects in the repetition group remembered significantly more ($\bar{M} = 70\%$) than subjects in either the typical group ($\bar{M} = 60\%$) or the categorical group ($\bar{M} = 50\%$). In the delayed recall conditions, subjects in the repetition group also remembered significantly more ($\bar{M} = 61\%$) than subjects in the typical group ($\bar{M} = 49\%$) and in the categorical group ($\bar{M} = 35\%$). Across all three modes of presentation, subjects in the immediate recall condition performed significantly better than those in the delayed recall condition.

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CHAPTER ONE

INTRODUCTION AND LITERATURE REVIEW

The problems of communication between professionals (or experts) and laypersons (or novices) extend across many domains. Nowhere is this problem more pronounced than in situations where vital instructions are given, such as in medical settings. In such contexts, the giving and remembering of instructions is of more than just academic interest - the effects can be life threatening or health restoring depending on the proficiency of the expert to instruct and of the layperson to understand and remember these instructions.

It is the communicating and remembering of instructions in medical contexts that is the subject of the present research. "Clinical medicine is above all else about communication between two people, it is about establishing an effective working relationship in which there is mutual trust" (Irwin, McClelland, & Love, 1989). This art of communication demands as much skill as the physical aspect of medicine, and seems much less easily operationalized and taught to medical personnel. The sections below will provide an overview of current research in the field of medical

communication, focusing especially on relationships between communication, compliance, satisfaction, and methods for improving the delivery and training of communication skills. First, however, it seems appropriate to discuss communication in more general terms.

I. A Review of the Literature: Communication

Effective Communication

What are the requisites for achieving good communication? Communication that is effective requires that a message be understood, remembered, and produce the desired effect (Ley & Spelman, 1967). The problem of achieving successful communication has many components, including issues of memory, cognition, language usage, and social issues.

Gerbner (1988) sees communication as "interaction through messages. Messages are formally-coded symbolic or representational patterns of some shared significance in a culture". For Jacobs (1985), the emphasis is on meaning, the "marriage" of language and communication, a subject he prefers to call discourse. Added to these fairly

traditional views is the current view of communication, one crossing many disciplinary lines: communication is socially-shared cognition, knowledge that is distributed across several individuals whose interactions determine decisions and problem solving (Resnick, 1991). A good definition, then, for the current purposes would include all of the above aspects of communication: communication, through the use of culturally shared speech or symbols, is the medium through which meaning, grounded in a shared cognitive and social context, is shared by one individual with another.

It must be noted here that communication and speech are not the same thing. Communication is a construct while speech is an ongoing event: speech exists only in the form of individual talking people. Wertsch (1991) cited a translation of Bakhtin (1986) regarding this temporal quality of speech: "The word in language...does not exist in a neutral and impersonal language...but rather it exists in other people's mouths, in other people's concrete contexts, serving other people's intentions: it is from there that one must take the word, and make it one's own." This process of taking in the other's meaning is very much THE difficulty in communication, for one can never really ever know or own the intention of other people's words.

One person may speak, but it takes at least two people to communicate. Before the process of "sharing meaning" can take place, there must be an assumption that the communicator and addressee have a vast amount of shared information or common ground: mutual beliefs, assumptions, and knowledge, which can be updated moment by moment. In addition, participants must gain common ground in a process called grounding - that is, establishing that what has been said has been understood (Clark & Brennan, 1991). Grounding is basic to any successful communication and is probably the primary problem in communication. One way communicators confirm grounding is by seeking evidence that they have been either understood or misunderstood. For example, recipients of a conversation (addressees) might say "Yeah" or "I know" or "Gosh" or some other small word to indicate they understand and can identify the other person's meaning. In communication, then, both speaker and addressee must work together in the making of a reference, sharing a mutual responsibility toward understanding each utterance.

Face-to-face communication imposes several constraints and costs upon its participants, one being cotemporality (Clark & Brennan, 1991). The addressee receives the message at almost the same moment that the speaker produces the utterance. There is little time for planning or revision.

Another temporal element is found in the utterance itself. Speech is said to be evanescent, suggesting that it rapidly fades away, leaving no trace. Another temporal constraint is imposed by the need for sequentiality: Speakers cannot get their turns out of order or meaning will be lost (Clark & Wilkes-Gibbs, 1986). In addition, face-to-face communication requires audibility and/or visibility. Finally, all communication requires a cost to the speaker - some sort of effort or time expenditure - and a similar cost to the addressee, that of listening.

Discourse Communities

"What individuals reason ABOUT, the knowledge they bring to a cognitive task, provides the interpretive frames or schemas that allow reasoning and problem solving to proceed" (Resnick, 1991). These schemas are not purely individual constructions, but are heavily influenced by the kinds of beliefs and reasoning schemas available in the individuals' surrounding culture and sub-culture.

The social nature of discourse must turn our attention to the notion of discourse communities: that is, communities of speakers that share a preferred way of speaking or writing and who, in part, judge the quality of an idea based

on the extent to which it is expressed according to community standards. Scholars in various disciplines, truck drivers, farmers, and members of most other vocations have a specific discourse community, as do any group of people who share ways of talking and reasoning with people like themselves (Resnick, 1991). For instance, Taylor (1987) found such an "in-house" language found among bankers in the financial communities of Great Britain. These bankers had their own jargon or slang terms which were only understood by those in their group.

The term REGISTER is widely used in sociolinguistic research to refer to these varieties of speech according to user (Hudson, 1980). This concept is meant to account for the same person's use of different words to express the same meaning depending upon social context. For example, in a chemistry lecture, the professor might say, "we obtained some sodium chloride", yet the same man at home would say, "I've got some salt". The phenomenon of code-switching refers to the idea that people belong to several discourse communities, each enabling and constraining thought in different manners. Which code an individual chooses depends upon their social construal of the specific cognitive situation and social context.

A problem arises when the speaker's discourse community

is not the same as the addressee's. The nature of this problem can be illustrated when it becomes crucial for a person to identify something quickly and securely, as when lawyers and witnesses in court are trying to establish the identity of a person, place, or thing (Clark & Brennan, 1991). Since people must appeal to their common ground to achieve communication goals, the instructors or explainers must start at the level of the least knowledgeable person and build from there. For example, a physician should not assume that a patient has a great knowledge of anatomy and pharmacology, but should begin with lay terminology (Isaacs & Clark, 1987).

Unfortunately, experts are often not aware of the specialized language they are using, which underlines again the need for constant awareness of speech on the part of explainers and instructors. In most situations, and at most times, people "engage in a kind of linguistic egocentrism ...we tend to assume that what we intend to communicate is in fact comprehended by the message recipient and that what we comprehend as the [message] is in fact what the sender intended to communicate" (Johnson, 1986). In an ideal situation, the novice and expert will accommodate to differences in expertise by the very act of collaborating to complete a reference. The important thing to remember here

is that the expert THINKS differently about his topic than the novice. "When people become experts on a topic, not only do they know more than novices, but their understanding of it changes...They can adopt more abstract perspective on the topic and organize their knowledge more on structural properties and less on surface feature" (Isaacs & Clark, 1987).

A second fact which needs attention is that the addressee is often very reticent to communicate or ask questions to an expert. Why might this be? McKinney (1982) pointed out that speech communication scholars have become increasingly concerned about this same problem of reticence, the inability of a person to communicate effectively when they need or desire to do so. Certain persons have this inability to communicate due to personal traits, such as shyness, introversion, or low self-esteem. However, the problem can be OUTSIDE the addressee and with the expert speaker who is intimidating or intentionally using technical speech.

One needs to be aware that values often are attached to certain registers of speaking: language can be used as a symbol of status or group membership. "People use their speech in order to identify the particular social groups to which they belong (or would like to be thought to belong)"

(Hudson, 1980). The use of a particular speech register can also be used to establish power in a professional-client dialogue. For instance, "power is often taken for granted as a component of medical encounters - a view that power in a medical setting is a given a priori fact, established by the differential position of individuals or groups within a social structure such as patient and physician" (Treichler et al, 1984). These authors see power as an emergent property from within patterns of communication over time. Where such patterns do exist, the explainer or instructor must wish to change her effectiveness and address the need to use less technical language to achieve communication goals. Many of these fundamentally social issues will be examined below when social issues in physician-patient communication are specifically addressed.

Oral Instructions

One vital form of communication is the giving and receiving of instructions in a face-to-face context. Instructions play an important role in our everyday lives - success in academic, business, and personal endeavors require the ability to successfully follow instructions. There are many advantages as well as problems to be

addressed when instructions are oral.

Cohen (1984) compared the differences between oral and keyboard instruction givers and discovered that the medium of communication - oral, keyboard, etc. - greatly influenced the ease or difficulty of transferring information.

Speakers are able to achieve more referential goals than keyboard users when giving instruction; that is, speakers explicitly request addressees to identify referents when keyboard users do not. This improved ability to achieve grounding is a definite advantage with face-to-face oral instructions.

Findings by Wright and Hull (1990) also illustrate the advantage of oral over other mediums of instruction for flexibility in meeting situational demands. In four experiments examining the content and sequencing of verbal instructions regarding corrections to be made in a typescript, the demands of the situation influenced the precision with which the subjects gave instructions. An explicit need for precision brought about very precise instruction-giving and much improved performance by the addressee. This sensitivity to situational context is one which should be remembered: if the instructor is frequently reminded of the importance of her instructions to her client, patient, child, etc., she is more likely to modify

instructions to meet this need. The key to this change is making the instructor aware, a problem that has yet to be solved in many domains.

The task of giving instructions is often intimately tied to the task of explaining. If one is given information that cannot be matched with relevant preunderstandings, an explanation is often sought. Questions and explanations always are relative to some presupposed background that restricts the range of possibilities. In explanation, as in other conversations, goals are achieved only if conversational participants orient their words and interpretations based on mutual assumptions. "A cooperative, effective communicator should say no more than is necessary to be understood by a listener. If a speaker can assume that the listener possesses particular knowledge structure, the speaker need express only part of the knowledge structure on the assumption that listeners can fill in the details from their own structure" (Turnbull, 1986). The problem arises here when the speaker assumes knowledge that the addressee does not possess, either through misappraisal by the speaker or through his habitual use of language which is unfamiliar or "over the head" of his addressee (see Discourse Communities above).

Memory Issues In Oral Instruction

Traditionally, memory has been considered to be a unitary faculty. Recent research, however, has led many to adopt the view that memory consists of many systems and subsystems with different operating characteristics (Tulving & Schacter, 1990). For instance, a glance at the table of contents in Baddeley's recent (1990) memory monograph reveals a large and, at times bewildering, list of memory systems: sensory, visual, auditory, short-term, working memory, visual-spatial sketchpad, procedural, episodic, and semantic. Several of these memory topics are relevant to the discussion at hand.

Penney (1989) believes that there is a separate store for auditorily and visually presented information. "These processing streams are seen to reflect the inherent structure of short-term verbal memory, and not to represent strategic processes" (i.e., structure not just function). The term "modality effect" is often used regarding the advantages of processing aurally presented information (Penney, 1989; Baddeley, 1990). These advantages involve the belief that auditory items are encoded in both the acoustic code, where they can be maintained for some time without deliberate allocation of attention, and in a

phonological code. Penney believes that within the auditory stream, successive items are very strongly associated, in contrast to the visual stream, where simultaneously presented items are strongly associated. This gives a slight memory edge, at least regarding short-term memory, to instructions and information that are presented orally.

In spite of this advantage, it is well known that in many cases of giving a series of typical oral instructions (such as from a physician or a teacher), half or more of the information is lost immediately (Ley, 1979a). Let us now turn to ways that have been experimentally demonstrated to improve the retention of these instructions.

One way to improve the retention of instructions is to avoid ambiguity. When ambiguity is unavoidable, one should keep the context informative and clear. Abbeduto and colleagues (1991) looked at how both normal and retarded children were able to select the appropriate referent when given ambiguous instructions. When the context was informative, both sets of children were successful in identifying referents. When faced with ambiguous instructions in an uninformative context, however, retarded children were unable to identify referents. Normal children faced with such a task often asked questions for clarification in order to accomplish the task. Certainly in

any situation where there may be reticence to ask for clarification, or in any situation where the mental ability of the addressee is not clear, the speaker should endeavor to embed instructions in an appropriate context, including clear examples or visual demonstrations. Once again, this would require awareness on the part of the instructor so that grounding could be accomplished.

Meyer and McConkie (1973) looked for ways to improve recall after hearing a passage. The variables tested were the serial position of the ideas in the passage, the perceived importance of the passage, the position of ideas in the logical structure of the passage, and extra repetitions of the passage. They found that ideas perceived as being more important to a passage were more likely to be recalled. They also found evidence that the effect of serial position and of rated importance were likely related to the logical structure of the ideas. On the first exposure to the information, the main ideas tended to be acquired better than ideas lower in the logical structure of the passage. Repetition was somewhat helpful to recall. In similar research to improve retention of information from "talking textbooks" for the blind, Aldrich and Parkin (1987) found two other ways to improve the retention of aurally presented information. One method involved the use of

repeated self-assessment questions embedded into the material. These questions were most beneficial when spaced out in the passage and not immediately following the tested material. It was also noted that subjects answered questions about a passage as accurately having heard only an expert summary as they did when they heard the whole passage. This reduced the total amount of material the student needed to deal with and made memory easier to accomplish. This type of summary would also be helpful in any situation where a large number of instructions would be given.

The structure of the information given is also very important. Experiments have shown that subjects hearing highly organized and categorized instructions had higher recall than those who heard the same information in a less organized fashion (Gardner, Hurd, & Slack, 1990).

Many, if not most, instructions in everyday life involve remembering acts to be performed at some time in the future: a series of errands to do after work; perhaps, a series of pre-dental surgery procedures. Future actions constitute a special class of too-be-remembered events, since they represent intended or envisioned events rather than perceived ones (Koriat, Ben-Zur, & Nussbaum, 1990). This type of memory is also called prospective

memory.

Koriat, Ben-Zur, and Nussbaum (1990) wanted to know if the representation of prospective memory consisted of a verbal instruction that was translated into action at the time of retrieval or if items were coded into a format that was tied to action, perhaps an imagined action schema, or even a hybrid of both codes. In their experiment, subjects heard oral instructions and were later asked to recall these instructions or to carry out the instructions out. Their results indicate that remembering verbal instructions for future performance is superior to remembering them for future recall. This suggests that encoding information for future performance may take the form of an action schema, thereby taking advantage of the richness of the motor and visual codes underlying performance itself (Koriat et al 1990). These authors strongly feel that there is an advantage to encoding verbal instructions in a manner stressing their future enactment, although they were not clear as to how this could be accomplished.

To conclude this segment, an excellent summary of two decades of experimentaton on methods to improve retention of oral instructions was presented by Philip Ley (1979), and contains many of the findings above. This advice (with an

extra instruction from Gardner, Hurd, and Slack, 1990) is applicable to any situation where oral information is given:

1. Give instructions and advice FIRST before presenting other information (Primacy effect).
2. Stress the importance of instructions.
3. Use short words and short sentences.
4. Give specific, detailed advice rather than general rules.
5. Repeat information.
6. Ask for a restatement of content by the addressee (Gardner et al, 1990).
7. Use explicit categorization where possible.

II. A Review of Medical Communication Literature

The Patient's Need for Information

In 1967, Cartwright found that patients expressed greater dissatisfaction with the information (or lack thereof) they received from their physicians than with any other aspect of health care. In spite of a great amount of research on giving medical information in the late 1960's

and 1970's, including several tested models for improving the delivery of medical information and instructions, one of the biggest patient complaints in 1991 remains the way physicians explained things to them (American Medical Association, 1991). In the 25 years since Cartwright's book, it seems that nothing has changed when it comes to patient satisfaction with doctors' communication of information.

Research by Gardner, Rullen, McGhan, and Mead (1988) looked at the perceived importance of medication information from the patients' point of view. Content analysis showed that medication instructions from the prescribing physician usually included purpose, amount, and dosage frequency. Precautions, adverse effects, and drug interaction information, however, were infrequently given to the patient. It is important to note that patients rated this (omitted) information as highly important. In this study, **one out of three** patients was not even given information on the purpose of their medication , and it must be noted that these patients did not ask for this information even though they indicated to the researchers that they wished to know it. (See Social Issues below and Discourse Communities above for a possible explanation for this reticence.)

In a similar vein, Keown, Slovid, and Lichtenstein

(1984) found that laypersons wanted all potential effects of a drug given, no matter how rare or minor, as opposed to the opinion of physicians in the study, who believed that only extremely dangerous or very frequent side effects needed to be disclosed. These two studies point out the wide discrepancy between the desire of patients to know complete information and the perception of their physicians as to the importance of that communication. One factor in this "selectivity" of what information to give patients may be the time constraint upon physicians. In 1985 the median length of general practice medical consultations in the United Kingdom was just under seven minutes (Tuckett, Boulton, & Olson, 1985). Since these seven minutes must include examination and diagnosis, it may be that physicians selectively filter the information best squeezed into the consultation time, with the "most important" information from the physician's point of view being given.

As Maguire (1984) stated, "If the patient's need for information is not established and heeded, serious misunderstandings may arise which hinder recovery". There obviously exists a big gulf between what doctors think their patients should know and the patients' desire for information.

Medical Communication: Social Issues

Many problems in physician-patient communication have been attributed to such factors as differences in the education, status, culture, and use of medical language between the health professional and the patient (Pendleton, 1983) (see Discourse Communities above). Is the amount of information given to patients during medical consultation correlated with the patient's gender or socioeconomic standing? This question was asked by Pendleton and Bochner in 1980 in research which revealed the following:

1. The length of the medical consultation seemed to be a function of differences between the physicians themselves rather than any factor relating to the patient.
2. Women, regardless of socioeconomic standing, asked more questions and received more information than men.
3. Doctors volunteered more explanations to patients of higher socioeconomic status.
4. Patients of lower status WANT more information but often feel intimidated and reticent to ask questions.

It is important to note that there may be an underlying but seldom spoken reason that doctors either do not give a lot of information or use medical jargon "over the head" of their patients: the giving of information reduces the power of the physician in the consultation, a power the physician may wish to maintain (Pendleton & Bochner, 1980; Bourhis, Roth, & MacQueen, 1989). Doctors work many long years to complete their education and the use of medical vocabulary established them as bona fide members of the medical community, with all the status and power granted in our society to this elite group.

In contrast, nurses also work hard to master medical language and could also use jargon as a way of asserting status. Unlike doctors, however, nurses seem to try to use everyday language when dealing with patients, suggesting that nurses are less concerned with status than with communication (Bourhis, et al, 1989).

Many physicians are either so rushed or so lacking in communication skills that they do not even bother to greet or introduce themselves to new patients (Maguire, 1984). This omission of the basic social aspects of communication also included: failure to obtain social histories, failure to ask for patients' emotional responses and wellbeing, being directive, using medical jargon, and giving platitudes

and pat reassurances rather than clarifying what the patient wanted to know. Maguire stated that doctors appear to become "hardened" over time, and less rather than more empathetic.

Factors Affecting the Patient's Memory for Information

One of the most vital aspects of medical communication is the patient memory for medical information and instructions given by the physician. Although not a sufficient condition in itself for compliance, accurate memory for instructions is surely a necessary condition for that compliance and also with other vital health issues related to compliance (Bradshaw, Ley, Kincey, & Bradshaw, 1975). A massive amount of the research done in this field has been carried out by Philip Ley and his colleagues. Beginning around 1965, Ley investigated aspects of communicating information from physician to patient, focusing especially on factors which play a part in remembering that information. In 1965, Ley and Spelman found that only 43% of the instructions given by the physician were remembered by the patient IMMEDIATELY after the consultation!

Ley and Spelman (1967) summarized findings for the

previous two decades which showed that up to 52% of all patients fail to comply with doctors' instructions. They also found that up to 65% of all patients wanted MORE medical information than they were told. Therefore it does not follow that patients do not desire to obtain and follow instructions. What factors, then, can account for the failure to remember or follow instructions in patients who wish to comply?

Medical Language

It is possible that patients fail to understand the instructions and advice given to them. Riley (1966) demonstrated that "quite a large area of ambiguity...exists for patients in carrying out what may be, to the doctor, a straightforward instruction". In a study of medical terminology, Boyle (1970) found that there were significant differences between doctor and patient definitions of common medical terms. Using 12 common terms, such as "heartburn" and "bronchitis", the ONLY term in which the patients' opinion agreed with the majority of the physicians' definitions was the term "good appetite"!

Preliminary work by the writer in 1991 found that medical personnel feel that the use of "medicalese" or medical jargon is a problem in giving instructions to

patients. Bourhis, Roth, and MacQueen (1989) pointed out that physicians and nurses are functionally bilingual: they speak medical language in addition to their native language. This must be taken into consideration in looking at medical communication patterns.

Noted above, physicians may use jargon to maintain a sense of power in the medical consultation. Doctors may also continue to use medical language because, after many years as a medical person, the use of medical language is the norm - it IS the everyday language of physicians. Because of this situation, physicians are no longer sensitive to the fact that the language they use may be unfamiliar to their patients.

Nurses also are an integral part of the medical setting and their importance to medical communication issues has been overlooked in research. Nurses often play a mediating role between the doctor and patient and may act as "translators", giving the patient in everyday language the medicalese spoken by physicians.

Research by Bourhis, Roth, and MacQueen (1989) found the following:

1. Doctors perceived that they used everyday language with their patients.

2. Neither patients nor nurses corroborated the doctors' opinion of using everyday language.
3. Nurses did indeed try to act as "translators" between doctors and patients.
4. Doctors, nurses, and patients all agreed that everyday language is the most appropriate way to communicate in medical consultation.

It is important to reiterate that the physicians in the above study thought that they were using understandable language with their patients when, according to their patients, they were not. Research has demonstrated that when a skill becomes highly practiced, it is difficult to monitor consciously the application of that skill; that is, the knowledge becomes implicit and difficult to articulate (Broadbent, FitzGerald, & Broadbent, 1986). This may partly account for the discrepancy in the reports by doctors regarding their language usage. Communication courses in medicine and nursing should emphasize the need to be sensitive to the different types of language employed in the medical setting (Boyle, 1970). Physicians need to be reminded that "it's not just the amount of information, it's the UNDERSTANDABILITY of information that leads to satisfaction" (Ley, Bradshaw, Kincey, & Atherton, 1976).

Amount and Type of Information Remembered

Is one type of information given to patients more difficult to remember than others? Ley and Spelman (1967) addressed this question in research which looked at the types of information given to patients. In examining the information categories of diagnosis, prognosis, office visits, and instructions, it was found that instructions were the most poorly recalled. Anderson (1979) noted that there was no clear association between the type of medical consultation (i.e. either the medical specialty of the doctor or the seriousness of the patient's condition) and the recall of information.

In studies of the amount of information forgotten by patients, patients tested for recall within 5 minutes after medical consultation had forgotten over 50% of the information given to them (Joyce et al 1969; Ley, Bradshaw, Eaves, & Walker, 1973). Anderson (1979) found that patients in his research forgot 60% of their medical information before they had left the doctor's office. The evidence show that the more information given to the patient, the higher the percentage of information forgotten (Ley & Spelman, 1967).

An interesting twist to the above data is added by research done by Robinson and Whitfield (1988) which looked

at the amount of medical instructions given by the physician which were remembered by the patient in relation to the number of spontaneous comments and questions raised by the patient. It had been predicted that the patients who actively engaged in comments and questions with the doctor would have a higher rate of remembering. In fact, these patients forgot significantly more than patients who remained quiet! These results confirm earlier findings by Anderson (1979) in which the degree to which there was voluntary interaction and questions from the patient INVERSELY affected the amount recalled. Apparently, when a patient is very busy thinking about questions to ask, a great deal of valuable information is missed. These results question the model of doctor-patient interaction which encourages questions from the patient. In view of these findings, Robinson and Whitfield (1988) suggest that "we need to look more closely at the consequences of active participation by patients...we need to take into account the information processing demands placed on the patient who attempts to present, to receive, and to integrate ideas within a short space of time".

Primacy and Modality Effects

There is a primacy but not a recency effect in remembering medical information, i.e. the first things mentioned are best remembered but not the last (Ley & Spelman, 1967; Ley, 1972). In a typical medical consultation, the first information given is usually the diagnosis, followed by prognosis and treatment, and finally, by instructions to the patient. Both doctor and patient rated that the most important information was given first: therefore the patient perceived that the last information given was the LEAST important. Ley found that by changing the order of information given, he could vastly improve the recall for instructions (Ley, 1972).

Interestingly enough, written information does not seem to result in better recall (Weinman, 1990). Weinman thinks that written information is a good supplement to, but not a substitute for, oral information. As mentioned in the Memory section above, a modality effect apparently exists within the actual structure of short term memory, with separate structures for short-term aural memory as suggested by Penney (1989). Her theory assumes that there is a superiority in recall ability for aurally encoded items within short-term memory, which may explain why Weinman found no improvement by supplementing oral instructions with

written ones.

Patient Characteristics

Many relationships between patient characteristics and recall have been examined. Anderson (1979) found no difference between men and women in the proportion of information correctly recalled. Interestingly, intelligence also does not seem to be a factor in recall of medical information (Ley & Spelman, 1967; Ley, 1979a). However, it must be noted that intelligence in these studies was operationalized as the amount of formal education, and caution should be exercised in interpreting these results.

Ley found two characteristics which were positively related to recall. First, he found a Yerkes-Dodson effect: a moderate level of anxiety on the part of the patient facilitated recall as opposed to either no or a large amount of anxiety. Secondly, the amount of medical knowledge of the patient positively correlated with recall (Ley, 1979a). This latter result lends support to Riley's (1966) finding regarding patients' problems with medical jargon. A high level of medical knowledge on the part of the patient means easier categorization of the information at the time of encoding and thus easier recall (Ley, 1979a). Certainly, some basic degree of lay medical knowledge is a

prerequisite for competence in adhering to a prescribed medical regimen (Gardner, Hurd, & Slack, 1990).

Anderson (1979) found no relationship between patient satisfaction with their doctor and amount of information recalled. This was somewhat contradicted by Ley's (1979b) findings that patient satisfaction with consultations was significantly related to compliance and compliance depended on accurate recall. Patient satisfaction with medical communication has a direct relationship to the degree of understanding the patient has of the communication, so all of these factors are inextricably linked (Ley, 1982b; Nagy & Wolfe, 1984). Nagy & Wolfe (1984) also found satisfaction related to the perceived treatment effectiveness.

One factor that needs special attention is the relationship between the patient's age and ability to recall. Age has not been consistently found to correlate with increased forgetting. Ley & Spelman (1965; 1967) found that older patients recalled MORE than younger ones. Note here that "older" referred to patients who were usually under 70 years of age. Winograd, Smith, and Simon (1982) found that both very young and the elderly had superiority over other subjects in memory tasks, involving concrete objects.

In contrast, Morrell, Park, and Poon (1990) conducted

research to determine the effects of presenting prescription information in a pictorial compared to a verbal format on comprehension and memory in young and old adults. They predicted that using pictorial symbols on prescription labels would facilitate recall for elderly subjects; mean age of 71 years. However, it was found that this was not the case, the verbal format being better for the elderly. These older adults had lower recall and comprehension than younger adults in both conditions. These results suggest that well-organized verbal prescription labels are more facilitative for the elderly and that additional efforts must be undertaken to improve the clarity of labeling on prescription drugs. One possible explanation for the difference in findings here and those mentioned above is that older adults seem to be at a disadvantage in remembering novel information relative to young adults. Perhaps the combination of novel prescription information and a novel format (pictures) put elderly subjects at a disadvantage. There is some evidence that visual imagery as a mnemonic device in the elderly is less useful than verbal mnemonics UNLESS the imagery is self-generated (Mason & Smith, 1977).

These differing results regarding the elderly and their memory make it clear that more research needs to be done to clarify the optimum way to present medical information to

this increasingly large percentage of the population.

Models for Improving Medical Communication

Research has shown that even when physicians are aware of communication problems and subsequently try harder to communicate, they do not necessarily do so more successfully (Pendleton & Bochner, 1980). The real need is not just a desire to communicate but specifically taught communication skills, and the critical time for teaching these skills is during medical training (Irwin, McClelland, & Love, 1989).

Maguire (1984) states that physicians need EXPLICIT guidance and training in communicating and relating to patients. He is quick to point out that doctors do not learn these specific communication skills by apprenticeship. Explicit training is a requirement for their development and internalization by novice physicians. At Queen's University in Belfast, this explicit training has been successfully implemented with the use of videotaping consultations and playing these tapes back with both peer and professor feedback, a model that could be implemented in most current medical schools without too great an additional capital outlay (Irwin et al 1989). It must be noted that nursing has had a very long history in emphasizing the importance of

communication training, one that could well serve as a model for the training of physicians in communication skills (Northouse, 1991).

In addition to improved communication training, researchers have explored several ways to improve the retention of medical information. One technique involved the physician's use of explicit categorization and the elimination of difficult medical terminology when giving instructions, which resulted in an improvement of 40% in the retention of information (Ley et al 1973). Ley & Spelman (1967) mention countering the primacy effect by changing the order of instructions given and by emphasizing to the patient that instructions are very important.

In research with pharmacy students, who should be experts in medication information, students had great difficulty recalling dosages. Students who were given medication information in an organized fashion, however, recalled significantly more than those in the "unorganized" group. These researchers stated that "Medication information should be presented in a highly organized manner, important points restated several times throughout the discussion...and a restatement of content by the patient should be sought" (Gardner et al 1990). Similar results were noted by Morris and Halperin (1979) with medical patients

rather than pharmacy students.

In preliminary research, interviews with RNs revealed that discharge from the hospital is a critical and distracting time: instructions given at discharge are very crucial to the patient's well-being but very difficult to remember. Foster (1988) stated that at discharge "verbal communication backed up by written documentation is necessary". It is now usually a requirement that hospitals and emergency rooms give written instructions for backup and reference to the oral instructions given patients.

Does written information really improve recall? Certainly there is overwhelming evidence that patients want more information and that approximately 80% will read written information when given (Weinman, 1990). Although the patient's knowledge is increased significantly by reading information, there does not appear to be better retention. (Recall the theory by Penney [1989] above, that aurally presented information was recalled better than visually presented information.) A problem with giving written information to patients is that of comprehension. Patients may very well read information but not comprehend it. For instance, Ley (1982a) showed that approximately two-thirds of the information sheets given out by health professionals are too difficult for about two-thirds of

their patients. Therefore, as mentioned in the above, written information should always be regarded as a supplement but not a substitute for good communication between the physician and patient.

Summary

One of the major problems in all medical consultations is the transmission of information (Pendleton, 1979). Not surprisingly, when asked, physicians attribute communications difficulties to problems lying outside themselves. There does not even seem to be agreement among those who train physicians as to what defines communication and communication skills (Eastwood, 1985).

In the substantial body of published literature regarding the accuracy or inaccuracy of patient remembering and understanding of medical communication, in most research "only the information offered by the doctor was analyzed and related to the accuracy of the patients' subsequent accounts" (Robinson & Whitfield, 1988). Communication is NOT a one-way transmission, and research must also examine patient-doctor communication as well. For instance, patients do not always provide doctors with a full or accurate account of their symptoms or reason for the

medical visit (Maguire, 1984; Ley, 1977). A substantial proportion of the problems which patients are experiencing when they consult their physicians remain undisclosed and undetected, especially those of an emotional or psychological nature. (Conversely, patients with known psychological problems often had serious physical problems ignored or overlooked by their doctors.) This aspect of the medical communication problem must be further investigated.

Ley (1981) brings up a serious problem that needs to be addressed if good medical communication and compliance are a desired outcome: the medical profession itself must comply with good medical practice. Ley found an alarming number of physicians and pharmacists who ill-prescribed, wrongly labeled, or otherwise showed bad judgement and carelessness in prescribing and dispensing drugs. Excellent communication skills cannot compensate for bad medical practice.

The medical community must come to an understanding of what communication is and requires. Sound communication ability is a fundamental of good medicine and nursing: the physician and nurse must meet not only the physical but the emotional and psychological needs of the patient population (Eastwood, 1985). An operational definition of effective communication demands that the message be understood,

remembered, and produce the desired effect (Ley & Spelman, 1967). Two criteria of whether the communication has produced the desired effect are patient satisfaction with the information given and patient cooperation in following the advice given. "Judged by either of these criteria, communications are poor and in need of improvement" (Ley & Spelman, 1967). In 1992, unfortunately, this statement is still true.

Research Questions

Most of the landmark research in medical communication was carried out in the late 1960s through the 1970s, especially the pioneering research by Ley and his colleagues. In addition to the fact that much of this research was done some time ago, the vast majority of research was carried out in the United Kingdom, with British subjects and under a different health care delivery system than that found in the United States. Given these facts, the current research seeks to ask a number of questions about the status of contemporary medical communication, especially the giving and remembering of instructions, in an American setting:

1. To what extent are remembering and understanding medical instructions perceived as a serious problems by both American medical practitioners and their patients in 1992? (Study One)
2. If remembering medical instructions is indeed perceived as a problem by physicians, what techniques for enhancing recall, such as those suggested by Ley's studies, do physicians incorporate into their delivery of medical instructions? (Study One and Two)
3. In a real clinical setting, how much and what types of information will be recalled? (Study Two)
4. In a real clinical setting, is there a relationship between the use of medical jargon ("medicalese") and the amount of information recalled or misremembered? (Study Two)
5. Does the forgetting or misremembering of medical instructions increase over the passage of time? (Study Two and Three).
6. In an empirical laboratory setting, how much and what types of information are forgotten or mis-remembered? How does this compare to the real clinical setting in Study Two? (Study Three)
7. With American subjects in 1992, will the use of

repetition or explicit categorization by the instructor substantially increase recall of information as happened with Ley's subjects in the 1970's? Is one of these methods more beneficial than the other? (Study Three)

The present work is designed to provide information on the extent to which American subjects living in 1992's "high tech" information society experience the same problems remembering medical instructions that Ley found prevalent 20-25 years ago. If indeed the situation is similar to that found by Ley, does this mean that Ley's research has been basically ignored/not adopted by American physicians, or will the physician survey reveal that these doctors never received any training in medical communicating in the first place? These studies may also reveal other factor(s) not considered in Ley's original work. Finally, results of these studies should help in the construction of a model for giving instructions which would improve the likelihood of these instructions being retained and not misremembered or forgotten. Such a model, after being empirically tested, could have profound implications for the improvement of health care delivery and medical education itself. This same model would be applicable to all fields of education, from classroom instruction to testing situations.

CHAPTER TWO: STUDY ONE

Part I: Patient Survey

Introduction

The patient mail survey was conducted to ask whether the public perceives that remembering medical instructions is a problem, and, if so, what types of instructions are most problematical. Personal examples from respondents experiences in this regard were solicited. This survey also sought the layperson's point of view on what, if anything, could be done to facilitate better doctor-patient communication.

Method

Subjects

Subjects for this survey were 200 Knoxville, TN, area residents. An equal number of males and females were selected from the Knoxville City Directory and various church directories. This procedure did not yield a random sample, and care was taken to choose subjects from the five geographical areas of the city and county: north, east,

south, west, and central. Participation was purely voluntary, with no incentive or remuneration for participation.

Procedure

Mail survey forms were sent to all subjects' home addresses. Each survey form was accompanied by a letter of explanation and a stamped, addressed envelope to facilitate returning the survey. The survey forms promised anonymity and asked only for participant's gender, age, and geographic area of the city. The one page survey forms contained the following four questions:

1. Doctors, nurses, and other medical people often give their patients oral instructions, such as medication instructions, things to do or NOT do, etc. Have you ever had the experience of forgetting or misremembering medical instructions? Has it happened more than one or two times?
2. Can you tell me about any special instance of forgetting medical instructions that stands out for you?
3. Do you think any particular type of medical instruction is harder to remember than others?
4. What do you think that doctors could do to make

their instructions easier for you to remember?

Results

There were 94 patient surveys completed and returned, and 31 which were returned as undeliverable, giving a response rate of 57%. Of the 94 completed surveys, 50 had complete demographic information and 44 omitted this information. Those respondents who included demographic information were 29 females and 21 males ranging in age from 27 to 89 years with a mean age of 53.5 years.

On question 1, 47% of the respondents thought that remembering medical information was a problem for them, and 32% felt that understanding medical information was also a difficulty. Of the 53% of respondents feeling that medical communication was NOT a problem for them, 8% reported they never or rarely see a physician.

For question 2, respondents provided 29 examples of memorable consequences resulting from forgetting or misremembering medical instructions. Many of these consequences related to dosages or time for taking medication. Patients forgot to take their medications with food resulting in discomfort and even stomach problems. Patients also completely ignored or forgot specific

medication instructions such as dissolving a pill in water instead of swallowing it whole. A different type of problem was noted by several patients who received their day surgery instructions in the recovery room while still under the influence of sedation. These patients were alarmed at this practice of giving instructions to incoherent patients and mentioned that NO recall of information occurred, resulting in repeated calls to the physician and needless discomfort. A similar incident happened to patient having dental surgery: having been given instructions while still sedated, this patient suffered a severe hemorrhage during an airline flight. The most notable of these responses are given in Table 1.

There were 49 total responses for examples of medical instructions that seemed hardest to remember. Several elderly respondents mentioned difficulties in remembering instructions for multiple medications, even though the directions were on the medication container; these respondents reported difficulty in planning when/how to take their numerous medications. Several noted difficulty in remembering whether or not they had actually taken their prescribed medication at a certain time or still needed to take it. Some respondents also noted the difficulties of receiving and remembering medical instructions under

TABLE 1

Patient Survey: Examples of Memorable Consequences
of Forgetting/ Misunderstanding Medical Instructions

1. "I went flying one week after oral surgery. The change in atmospheric pressure caused quite a bit of bleeding. My dentist insisted he had warned me about this."
2. Patient had been instructed to take medication every other day. "Every evening [I] wondered if I took it this morning or was it yesterday."
3. Patient remembered to take medication but forgot about side effects. A side effect was perceived as a serious medical crisis until the patient was told that this was a common and not unexpected side effect.
4. Patient with small children finds remembering the pediatrician's instructions a recurring problem. She is constantly distracted from attending to the oral instructions by her sick, upset children.
5. "Following total hip replacement I was told not to put ANY WEIGHT on the new hip. A day or so later the surgeon saw me using a walker and hopping on my 'good' leg. He changed the instructions, allowing me to put enough weight (30 pounds) on the new hip to steady myself. I STILL DO NOT KNOW HOW TO DETERMINE THE THIRTY POUNDS."*
6. Patient developed a serious stomach problem because he forgot the physician's instruction to take the medication with food.
7. Patient was struggling to swallow extremely large pills. When the physician was contacted about this difficulty, the patient was reminded that the instructions had been to DISSOLVE the pills in water.
8. Patient was sedated after day surgery when doctor explained post-operative care. Groggy from this medication, the patient misunderstood and suffered severe esophogitis from mis-taking medications.

*Emphasis by patient.

conditions of stress and anxiety. These responses are outlined by category in Table 2.

When asked what physicians could do to improve medical communication, 75% of respondents felt that physicians should always give written instructions, and several suggested the use of computerized forms for this purpose. Five percent of all respondents mentioned the use of medical jargon and felt that physicians should be trained to recognize and avoid such terminology with patients.

Part II: The Physician Survey

Introduction

This mail survey was conducted to ask if general practice and family physicians feel that remembering and understanding instructions is a problem for their patients, and, if so, whether any memorable consequences of this problem have occurred. Examples of typical instructions and their memorablity were solicited, as well as techniques used to increase their memorablity. A last but important purpose of this survey was to discover what percentage of family and general practice physicians in the survey received

TABLE 2

Patient Survey: Instructions Most Difficult to Remember

Type of Response	Percentage of Responses
The timing of taking medications	20.4
ANYTHING verbal, not written	16.3
Multiple medications	14.3
Variable dosages of medications	10.3
Procedures not related to medications	8.2
Any with technical language	4.1
Instructions received under stress	4.1
Future physician's appointment(s)	4.1
Pre- or Post-op instructions	4.1
Drug interaction and side effects	4.1
Instructions given by rushed doctor	2.0
Instructions for psychological problems	2.0
Actual medication dosage	2.0
Any instructions that are long and complex	2.0
Pain Management	2.0

Total	100.0

communication training in medical school.

Method

Subjects

Subjects for this survey were 350 family and general practice physicians in five different American urban areas: Knoxville, TN, Boston & Cambridge, MA, Seattle, WA, Chicago, IL, and Houston, TX. These cities were chosen because of their diverse geographic areas and the location of large medical centers in these areas.

Seventy physicians were chosen at random from the listings of family and general practitioners found in the American Medical Association Directories and the Who's Who Directory of Medical Specialists, 1991-92 for each of those cities.

All subjects participated voluntarily, with no incentive or remuneration offered for participation.

Procedure

Mail survey forms were sent to the physicians' business addresses. All survey forms were accompanied by a letter of explanation and a stamped, addressed envelope to facilitate

returning the survey. The survey forms requested no identification or demographic information except for the participant's geographic area. The one page survey forms contained the following seven questions:

1. Do you think that remembering instructions is a problem or issue in medical compliance?
2. Do you think that understanding the instructions is part of the problem (if you perceive a problem)?
3. Can you think of any outstanding experience when a patient misremembered or failed to remember instructions with some memorable consequence?
4. What type(s) of instructions do you typically give patients?
5. Are there types of instructions that you think are more difficult to remember than others?
6. Do you use any special techniques when giving instructions to your patients to facilitate their memorability?
7. Were you given any special training in medical school in the communication of medical information?

Results

There were 71 responses on the physician survey. With 350 surveys mailed and 58 returned as undeliverable, this gives a 24.3% rate of response for those delivered. Of those 71 responses, 24 were from Knoxville, TN, 18 from Houston, TX, 15 from Seattle, WA, 9 from the Boston-Cambridge area, MA, and 4 from Chicago, IL.

Ninety-six percent of the responding physicians felt that remembering instructions was a problem for their patients. One half of those respondents underlined and emphasized their "yes" response in some way. Ninety percent of these physicians also felt that understanding instructions was also a problem for many of their patients.

When prompted for any memorable consequences of misremembering or forgetting instructions, several physicians remarked that for legal reasons, they could not comment upon this but that there did exist many examples that they would rather not give. Examples which were provided by physicians are highlighted in Table 3.

Fourteen percent of all respondents noted that multiple medications, the timing and frequency of medication dosages, and medications with variable dosages were all harder for their patients to remember. Other difficult instructions mentioned were those given under conditions of stress and

TABLE 3

Physician Survey: Memorable Consequences of Patient
Forgetting/Misunderstanding Medical Instructions

-
1. Patient took heart medication twice a day, rather than four times a day as directed, with extremely bad consequences.
 2. A patient with poor English misunderstood the instructions and went into kidney failure and dehydration.
 3. Doctor reports lots of memorable LITTLE results when patients took birth control pills incorrectly.
 4. One physician remarked that he still cannot believe that he had a patient who inserted rectal suppositories without removing the wrappers...
 5. Patient took the wrong dosages and went into seizures.
 6. "Many times my patients don't complete the entire antibiotic regimen and get relapses."
 7. Physician reports that many of his patients will skip the night dose when asked to take a medication every six hours. This physician now instructs the patients to take the medication every six hours and to be sure to get up in the middle of the night for that dose as well.
 8. "I told a patient to use a [rectal] suppository every four hours and he swallowed them!"
 9. Patient took sleeping medication three times a day although clearly instructed only to take one at bedtime.
 10. A patient on two medications was told to double the dosage on one of the medications. She doubled the wrong medication, leading to toxicity.
 11. Physician changed anti-coagulant dosage. Patient, however, forgot this and suffered very serious bleeding.
-

long, complicated instructions; refer to Table 4 for examples of these results.

Physicians typically resorted to repetition, either on their part or having the patient repeat the instructions, or to written instructions to improve the remembering of medical instructions. Several physicians mentioned that they had certain routine instructions which they printed and kept available for patients.

Finally, 82% of respondents replied that they had received NO communication training of any sort in medical school. A number felt so strongly about this lack of training that they included their names and addresses with a note regarding the difficulty of this part of their medical practice and the need for implementing or improving communication training in medical schools.

Discussion

The results of these surveys confirm the fact that remembering medical instructions is indeed perceived as a serious problem by both American patients and physicians. It is not merely an inconvenience but a serious health threat when nearly half of all patients experience difficulties in remembering medical instructions. Both

TABLE 4

Physician Survey: Most Difficult Medical
Instructions to Remember

Type of Instruction	% of Respondents Listing This Instruction
Timing and Frequency of Medication	18%
Variability of Medications	16%
Multiple Medications	16%
Diet/Exercise Instructions	7%
Long Instructions	5%
Instructions Under Stress	5%
Instructions to Elderly	5%
All verbal instructions	5%
Rare Illnesses	4%
Inhaler Instructions	4%

physicians and patients agree that medication instructions are the most difficult to remember, especially multiple medications and variable dosages.

With the majority of patients feeling that written instructions would be the best solution for reinforcing verbal instructions, it is noted that less than half (45%) of the surveyed physicians even occasionally provides written instructions for their patients to take home. It would not be difficult for physicians to have pre-printed instructions for the medical problems most typically treated in their practices.

Although the overwhelming majority of physicians felt that patients had difficulty in comprehending instructions, few mentioned intentionally simplifying their use of medical language to reach the patients' level of comprehension. A possible explanation for this would be the physicians' lack of communication training in medical school/internship. Such training would afford physicians invaluable techniques for grounding communications and developing sensitivity to the patients' level of comprehension. Such skills would lead to a reduction in suffering on the part of patients and to increased efficiency on the part of the physicians, with implications for reducing medical malpractice lawsuits. With only 12% of responding physicians reported having

received any communications training, an effort to make this training a mandatory part of medical school could lead to much improvement of many of these communication problems.

CHAPTER THREE: STUDY TWO

Introduction

Study two involves an examination of the memory for medical instructions in actual medical consultations. This small-N study is similar to a study done in the United Kingdom by Ley and Spelman (1965). Would 1992 see an improvement in the amount of data recalled by American patients compared to the British patients in 1965? An additional issue considered in this study is the effect of the passage of time as a factor in the amount forgotten by subjects.

Method

Subjects

Subjects were 18 female and 16 male University of Tennessee students who were outpatients at the University of Tennessee Student Health Clinic. All subjects were volunteers and received no incentive to participate.

Physicians

There were two participating physicians, both specialists in family medicine. Both physicians were male and participated on a purely voluntary basis, alternating days of participation.

Procedure

On the appointed experimental days, all patients of the participating physician were given the opportunity to participate if their medical problem was deemed appropriate by the intake nurse. By prior agreement with the clinic administrator, no sexual, pregnancy, or emotional problems would be included in the study. Due to constraints upon available physician participation and the desire for a similar number of subjects to Ley and Spelman's 1965 research, it was also agreed that there would be no more than 40 subjects. Those patients who did volunteer to participate were told that they might elect at any time during the medical interview to discontinue participation with no further obligation. For additional patient protection, physicians also were advised to discontinue the patient's participation if an unexpected or potentially embarrassing problem were to develop in the course of the medical consultation. Subjects who volunteered to

participate read and signed an informed consent agreement.

Subjects who volunteered were so identified to the attending physician. The physician tape recorded the instructions which were given to that patient during the medical consultation; no other portion of the medical interview was recorded. All tape recordings were made with a tape recorder placed in full view of the patient. The physician clearly pronounced the patient's name at the beginning of each instruction episode to facilitate identification and transcription.

After the medical consultation, subjects were taken to to the researcher and asked to fill out a brief clinic evaluation form both as a distractor task, to discourage any repetition or rehearsal of the doctor's instructions, and as part of the clinic director's ongoing evaluation process. A sample of this evaluation form can be found in Appendix One.

After completion of this task, every other subject was asked to orally recall the instructions given by the physician and recorded on tape. The tape recorder was clearly visible to the participant. The researcher clearly pronounced each subject's name before having the subject give the repetition of instructions to facilitate identification and transcriptions. When the subjects indicated completion of this task, they were given an

information sheet about the project and allowed to leave.

Those participants who were not immediately recorded were told, after completing the distractor task, that they would be contacted by telephone in 3 or 4 days for a final task. The researcher verified the day and evening telephone number for the participant and then gave each a project information sheet and reminder of the upcoming telephone call. These subjects were telephoned by the experimenter 3 to 4 days following their medical consultation, and the entire telephone conversation was tape recorded. When successful telephone connection was made, the experimenter clearly enunciated the subject's name for later tape identification and reminded the subject of the reason for the call and that the call was being tape recorded. The subject was asked to recall the exact instructions given by the physician during the medical interview.

Results

All physician and subject tape recordings were transcribed and coded by amount and category of instruction. The categories of instructions included procedures, prohibitions, and prescriptions. The procedure category included instructions which represented any actions for the

patient to carry out, excluding medication-related activities. Such instructions included instructions to keep one's foot elevated, to eat only bland foods, to keep a bandage dry, or to return to the office in five days.

The prohibition category included any activities forbidden by the doctor with the exception of negative medication-related instructions, such as an instruction not to do any heavy physical activity. To be included in the prohibition category, the instruction had to be a negative statement and include the word "not". For example, "don't eat any solid food" would be considered a prohibition for the purposes of this analysis, but "eat only clear liquids" would be considered a procedural instruction.

The prescription category included any and all instructions related to medications. This would include dosages, timing of dosages (such as time of day or with meals), name of medication, and contraindications if given. Table 5 provides examples of how these three categories were coded for typical instructions.

There was no significant difference in the amount recalled based on which physician was instructing or the gender of the subject. The mean recall of instructions by the subjects was 57%, with three subjects having perfect recall. There was no significant difference in the overall

TABLE 5

Study Two: Coding of Medical Instructions

Code Category	Criteria
1. Procedure	a. an instruction for an action to be taken by patient b. not related to medication c. EXAMPLE: Keep your foot elevated.
2. Prohibition	a. an instruction for an action NOT to be taken by patient b. must be stated with "not" or other negative c. not related to medication d. EXAMPLE: Don't eat any solid food.
3. Prescription	a. ANY medication-related instruction b. includes negatives related to medication c. EXAMPLE: Take 2 Tylenol every 4 hours for pain.

EXAMPLE SENTENCES:

"Take one penicillin 3 times a day until it is gone."

Coded: Prescription containing 4 instructions:

1. Type of medication (penicillin)
2. Amount of dosage (one)
3. Frequency of dosage (3 times daily)
4. Duration (take until no pills remain)

"Keep this bandage dry and come back Friday to change it."

Coded: Procedure containing 3 instructions:

1. Keep bandage dry.
2. Return to change bandage.
3. The date of return is Friday.

recall by time condition, with a mean rate of recall of 59% in the immediate recall condition and 55% in the delayed recall condition. It must be noted, however, that the distribution was very different in these two time conditions. As seen in Table 6, the responses in the Immediate Recall condition were not normally distributed. Within each instructional category, there was also no significant difference in the amount recalled in the delayed and immediate recall groups. Table 7 presents a summary of the statistical data by experimental condition, physician, and instructional category.

Qualitative analysis of the physician transcripts revealed little usage of medical language. It appeared that every effort was made to use everyday language or, when necessary, explain medical terminology. The doctors asked all patients if they had questions regarding their instructions, and both used repetition to reinforce the instructions.

Discussion

In the study by Ley and Spelman (1965), 47 patients in a clinical setting recalled only 43% of the medical instructions and advice given compared to the mean recall of

TABLE 6

Study Two: Distribution of Recall by Group

% Recalled	Number of Subjects	
	Immediate	Delayed
7.5%	0	2
22.5%	3	0
37.5%	3	3
52.5%	2	4
67.5%	3	5
82.5%	2	4
100.0%	3	0

TABLE 7

Study Two: Data Summary

	N	Mean Recall %	Standard Dev.
By Recall Group			
Immediate	16	59%	26%
Delayed	18	55%	23%
Combined	34	57%	24%
By Physician			
Doctor 1	14	56%	31%
Doctor 2	20	57%	19%
By Instructional Category			
Procedures	34	52%**	34%
Prescriptions	24	65%**	35%
Prohibitions	11	19%**	35%

**Recall significantly different by category, $p < .001$.

57% by the student participants in this current study. One cannot assume much from this difference, since only a summary of Ley's data is available. Certainly one can conjecture that the difference in physicians, subject age and population, and instructional style of physicians would be a factor in this difference. It is highly likely that contributing to this difference were the way in which the current subjects were selected and the fact that many subjects were eliminated by the constraint of type of medical problem allowed in this study by the clinic administrator and human research committee.

Only 11 subjects in this study received instructions in the Prohibition Category; there seems to be no clear explanation why these were the most poorly remembered. Neither is there an immediate and apparent explanation for why the Prescription Category was best remembered, given that both doctors and patients in Study One considered medication instructions the hardest to remember.

The instructional style of the clinic physicians deserves comment. Even considering that demand characteristics of this study probably influenced the physicians' delivery of instructions to some extent, the fact remains that there was **NOT ONE EXAMPLE** where these physicians used medical jargon or specialized language in

any of the interviews without voluntarily and immediately explaining the terminology used. This study was conducted over several normal (and busy) days at the clinic, yet examination of the transcripts shows no lapse into medical jargon even at the end of the study, which would have appeared had physicians changed their style of instructional delivery while being tape recorded. Both physicians sought grounding, i.e. to establish that their instructions had been received and understood, with the patients by asking for questions, and both physicians summarized and repeated their instructions.

Considering the great care with which physicians gave their instructions, one might hope that the majority of instructions would be recalled. Given that 43% of the instructions were forgotten, it appears that the main problem may well turn out to be the limited processessing and short-term memory capacity of the human when oral instructions are given under time constraints (physicians') and stress situations (patients'). By any standard, however, the students' recall of only 57% of given instructions indicates that a serious medical communication problems exist, a problem not only compromising the health of patients but also creating serious legal and professional problems for physicians.

CHAPTER FOUR: STUDY THREE

Introduction

This laboratory study sought to compare three modes of presenting oral medical instructions: typical, repetition, and categorical. Research has suggested that repetition or presenting medical information in a highly categorical manner would improve retention. This study contrasted these 2 methods with the traditional way of giving medical instructions, and it was hypothesized that both the categorical and repetition conditions would have significantly higher retention than the typical presentation mode. In addition, the passage of time was examined in order to determine its effect on the forgetting of instructions in the three formats. It was predicted that subjects in the delayed recall conditions would recall significantly fewer medical instructions than those subjects in the immediate recall conditions.

Method

Subjects

The subjects for this study were 107 male and 108 female undergraduate students enrolled in psychology courses at the University of Tennessee. Students volunteered to participate in this research in exchange for extra credit in their psychology courses.

Procedure

This study had three groups: those receiving typical medical instructions (Typical Group), those receiving highly categorical medical instructions (Category Group), and those receiving a repetition of instructions (Repetition Group). All instructions used lay terminology and no medical jargon. Each experimental group had two levels: immediate recall and delayed recall. All three instructional groups received the same instructions for the care of a severely sprained ankle in the format for that group: typical, repetition, or categorical. These common sprain-care instructions included admonitions to stay off the foot, use crutches, keep the foot elevated, keep ice on the foot, and take regular-strength ibuprophen for the pain, returning in a week if the ankle had not healed. The Typical Group received routine instructions for post-sprain care with neither repetition or

explicit categorization of instructions. The Repetition Group received the same instructions as the Typical Group, but the subjects were asked to repeat the instructions back to the experimenter, who then corrected any incorrect or omitted instructions one time. Individuals in the Category Group were given these same instructions presented in a highly categorical manner, organized with the acronym R.I.C.E. (Rest, Ice and Ibuprofen, Compression, Elevation). See Appendix Two for transcripts of the actual instructions in each condition.

Sign-up sheets were posted for soliciting participants, with an equal number of spaces available for males and females. There were separate sign-up sheets for each day, and on each day a different condition and level were conducted. All subjects were tested individually.

At the day and hour assigned, individual subjects were given informed consent forms to read and sign. Each subject was then taken into a small office equipped with desk, chairs, and books, and asked to assume that they were there for a medical consultation and that the experimenter was their physician. The experimenter wore a white lab coat to facilitate this assumption. Each subject was then given the diagnosis of a severely sprained ankle and medical instructions based on the format being run that day:

typical, categorical, or repetition.

After hearing these instructions, each subject was taken back to the laboratory room equipped with tables and chairs and asked to fill out a short personality test. This test, based on the Meyers-Briggs test, was a distractor task and took approximately five to ten minutes to complete. The purpose of this task was to prevent repetition and practice of the medical instructions.

In the immediate recall conditions, subjects were interviewed individually after completing the personality test. Subjects were taken to a small room equipped with desk and chairs. The experimenter turned on a tape recorder and placed it in full view of the subject. After saying the subject's name clearly to facilitate transcription, the experimenter asked the subject to recall orally the medical instructions given earlier. There were no time constraints placed on recall. When the subject indicated that recall was completed, the subject was given a short true-false quiz on the medical instructions and then given an extra credit slip to complete.

Subjects run in the delayed conditions did exactly the same tasks, but were asked after taking the personality test to return in 3-4 days to complete the experimental tasks. When the subjects returned on those days, they proceeded to

recall the medical information and take the short quiz exactly as above.

Subjects in the Repetition Group were asked to repeat the instructions one time to the researcher. This quickly established any errors or omissions, which were then corrected one time by the researcher.

Results

All tape recordings were coded by listening to each subject's recorded response and by circling remembered instructions on a typed protocol key sheet containing instructions for that subject's experimental condition. The researcher listened to each tape recording three times to avoid possible omissions and errors. These coded data as well as demographic data were then analyzed statistically.

The mean rate of recall over all conditions was 54%. There was no gender effect. Non-native speakers recalled significantly less instructions overall than native English speakers ($M = 43\%$), $t(212) = -2.61$, $p < .0097$.

An analysis of variance using a General Linear Model with SAS (Model: Total % recalled = time + group) revealed significance for both time (delayed vs. immediate recall)

and instructional category, $F(3, 211) = 26.82, p < .0001$. There was no significant interaction between time conditions and instructional categories. Both Tukey's Range Test and Scheffe's Test for multiple comparisons yielded significant differences between all six experimental conditions. The Repetition Group recalled significantly more than the Typical Group, which in turn recalled significantly more than the Categorical Group. Within each instructional category, the immediate condition recalled more than the delayed condition. The means and standard deviations of the six experimental conditions are presented in Table 8.

The mean recall of experimental items by the Categorical Group was 43% overall, however their recall of the acronym R.I.C.E. and its categories was significantly higher than their recall of the general instructions, ($M = 81\%$), $t(59) = 7.59, p < .0001$.

Each separate item to be recalled was coded according to whether the instruction was Procedure, Prohibition, or Prescription (as in Study Two). The mean recall for these is presented in Table 9. These items, numbered 1 - 20 in order of presentation during the experiment, show very clearly that there was neither a primacy nor a recency effect in this data: the items in the middle tended to be remembered more than the first or last items. There were

TABLE 8

Study Three: Means and Standard Deviations
of the Six Conditions

Group	N	Mean	SD
Repetition, Immed. Recall	38	69%	18% **
Repetition, Delayed Recall	35	60%	13% **
Typical, Immed. Recall	33	60%	14% **
Typical, Delayed Recall	51	48%	19% **
Category, Immed. Recall	27	50%	24% **
Category, Delayed Recall	31	35%	18% **

** All comparisons (Tukey's and Sheffe's) significant
at the 0.05 level

TABLE 9

Study Three: Performance on Instructional Items

Item*	Type	% Correct
1. Stay off ankle	Procedure	61
2. Duration of 1. above	Procedure	40
3. No weight on ankle	Prohibition	24
4. Use crutches	Procedure	63
5. Elevate foot	Procedure	76
6. Use elastic bandage	Procedure	78
7. Use 6. all day	Procedure	52
8. Do not sleep in 6.	Prohibition	59
9. Use ice packs	Procedure	81
10. Use 9. two days	Procedure	61
11. Use 12. after tomorrow	Procedure	54
12. Soak foot in hot water	Procedure	76
13. Quantity of 15.	Prescription	50
14. Strength of 15.	Prescription	32
15. Take ibuprofen	Prescription	77
16. Frequency of 15.	Prescription	48
17. Take 15. with food or milk	Prescription	39
18. See doctor in a week	Procedure	46
19. Condition for 15. above	Prescription	48
20. Condition for 18. above	Procedure	21

* Each item averaged across conditions.

no significant differences in the memorability of the types of items in this study.

A paired-comparison t test between percentage recalled on posttest compared to overall percentage recalled revealed that the posttest score was significantly higher, $t(214) = 20.7$, $p < .0001$.

Results on the distractor task, the shortened Meyers-Briggs test, showed no significant correlation with personality factors and recall.

Discussion

With a forgetting rate of over 46%, this study emphasizes once more the difficulty of remembering oral instructions. Even though instructions contained no medical jargon and were not given under the conditions of pain or stress which often accompany real medical situations, they were not well recalled. The subjects having the worst performance were non-natives for whom English was a second language. Although these student subjects were eager to participate and seemed very attentive during the experimental process, the fact remains that processing such an amount of verbal information was a very difficult task for them. This suggests that physicians need to take extra precautions to insure that non-native speakers have

understood the instructions, perhaps grounding such instructions in repetition and soliciting feedback and questions from these patients.

The differences between conditions in this experiment were very clear cut. Repetition proved to be the superior way to improve retention. It had been hypothesized that the Categorical Group would also score higher than the Typical (control) Group, but that did turn out to be the case. Since this Categorical Group remembered almost 81% of the mnemonic acronym and the categories for which it stood, perhaps the acronym and categories were more figural to the subjects and perceived as the most important aspects to remember. It is also possible, given the known limitations of short term memory, that the addition of these items caused an overload instead of a facilitation for memory processing.

Since the passage of time was such a significant factor in this experiment, it merits further research and development in the future. Certainly, remembering medical instructions at the end of a medical consultation itself is no guarantee they will be remembered several days later. Since many if not most medical instructions involve activities that must take place over an extended time, finding ways to insure the memorability of these

instructions remains critical to improving the overall satisfaction and reliability of health care delivery.

CHAPTER FIVE

SUMMARY AND CONCLUSION

The three studies described in the previous chapters deal with many issues and aspects of giving and remembering oral medical instructions, a vital facet of medical communication. A review of these findings will now be presented, given as answers to the original research questions presented in the Introduction.

Question 1 asked to what extent remembering and understanding medical instructions is perceived as a serious problem by American physicians and patients. Prior research suggested that at least half of these respondents would consider this a serious problem, and results supported this hypothesis. In fact, nearly all responding physicians considered these aspects of medical communication to be a serious concern, and a similar number of physicians had received little or no training to give these vital instructions to patients. Physicians felt so strongly about this lack of training that many wrote personal comments after this survey question, and several included their names and addresses for further information or correspondence. This response suggests that designing some sort of course,

continuing education credits, video instruction, or some other method to give insight to physicians regarding medical communications would be highly desirable. In addition, results of this survey underlined the urgent need to continue the development of stringent (not "token") communication skills courses as an integral part of the medical education curriculum. Medicine has been exceeded by nursing educators in developing such needed programs.

Question 2 concerned the nature of the techniques employed by practicing physicians to help insure the memorability of their instructions. About 45% of survey respondents reported using some written instructions at least occasionally as a backup to oral instructions. Other respondents reported repeating instructions or having their patients repeat them. Physicians responding to the survey made no reference to the intentional use of lay terminology nor to making any attempt to use language attuned to the cognitive and linguistic level of the patient. Physicians in the clinical study primarily used the techniques of repetition and queing the patient for any questions they might have had regarding their course of treatment.

The topic of the third research question was an inquiry into the amount of information that would be recalled by patients in an actual clinical setting. Patients in this

study recalled 57% of the instructions given by their physicians. This value was 13% higher than the percentage recalled by Ley and Spelman's British subjects in 1965. Differences in the physician and subject population as well as the communication styles of these physicians can probably account for part of this difference; certainly, the screening procedure used to secure subjects for the current research eliminated many, many potential subjects and reduced the overall diversity of the types and seriousness of medical problems represented by this university population.

An additional aspect of the above question was what type of information was recalled by the clinical subjects, with this information coded as either procedural, prohibitive, or medication related. Results indicate that the medication information was the best recalled by these subjects, despite the fact that mail survey results had indicated that these instructions were considered the most difficult to remember by doctors and patients alike. In examining the transcripts of the physician tapes in the clinical study, it was found that the physicians repeated medication instructions, usually twice and often three times. Perhaps this repetition reinforced the medication instructions. It is also likely that the delayed recall

group had read their prescription or medication labels several times, and such repetition had perhaps reinforced the doctors' instructions. The instructions least given and remembered were prohibitions, such as "Don't eat any solid food". There is no explanation for this, but one conjecture could be that subjects failed to categorize prohibitions as instructions, instructions interpreted as things "to do" rather than things "not to do". Therefore, when asked to recall instructions, the prohibitions may have been omitted.

Question 4 asked if there is a relationship between the use of medical jargon in the clinical study and the amount of information recalled by the patients. It was found in this study that physicians used little medical terminology and when they did do so, they explained it clearly and immediately. This fact alone may account for the disparity between these students' mean recall and that of Ley and Spelman's patient subjects. It also points out that the use of medical jargon cannot account, in this case, for the 43% of the medical information forgotten by these student participants. It must not be assumed that patients under care of other physicians would perform as well as the present set of student subjects. From the comments made in surveys analyzed in Study One, medical terminology is a problem for many patients, and the majority of physicians

feel that patients have problems with understanding. Perhaps we were dealing with two exceptionally good physicians in the clinical study. Perhaps, as well, when one is on salary rather than being paid by the number of patients seen, one can afford to take the time to communicate better.

It was predicted in Question 5 that those subjects in Studies Two and Three in delayed recall conditions would remember significantly less information than those in the immediate recall conditions. This was certainly the case in Study Three, with subjects in all instructional categories remembering significantly less in the delayed recall conditions. This result, however, did not hold true for subjects in the clinical study where differences in the delayed and immediate recall group in this study was small and statistically insignificant. No explanation can be offered for this occurrence. There was no medical terminology in Study Three either, so language is ruled out as a factor in this disparity. It needs to be noted, however, that subjects in Study Three had a long set of instructions compared to those received in many of the clinical situations. There was no variability in length of instructions for Study Three with the exception of the acronym which was used in the two categorical conditions. The clinic instructions, however,

were variable, and many were quite short in length. It is to be expected that the greater the amount of information given, the more will be forgotten.

Question 6 sought to compare the types of information best remembered in Study Three with that remembered in Study Two, where medication information was best remembered. The majority of items in Study Three were procedural items, and there was no significant difference between types of items in the amount remembered. In both studies, prohibition instructions were fewest, and these were remembered worst in Study Two but performance on these items varied in Study Three. It is this researcher's opinion that it was the amount and not the type of information in that contributed to forgetting in Study Three.

The last research question dealt with which method of instructional delivery in Study Three would contribute most to recall improvement. This result was very clear cut and significant: repetition was clearly superior to the other two methods of instruction. Perhaps categorization was ineffective due to the added length which this method gave to the already long set of instructions. This cannot be assumed without further testing. It needs to be noted, however, that repetition is an easy and productive way to improve memory for medical instructions, a technique that

would not significantly change the physician's already established communication style. It can be seen as an addition and an easy one at that.

There are a number of remaining items of interest and concern that need to be considered. The first involves the problem of communicating with non-native speakers. Several of the physician respondents in Study One mentioned the difficulty of medical communication in communities with large ethnic or non-native populations. A physician from Houston with a large Hispanic patient population commented that a number of near tragic misunderstandings had occurred because of the language barrier. This physician noted that he always tries to use simple language and repetition, but also mentioned the reluctance of many non-natives to ask questions. Apparently there is either a fear of embarrassment or of the doctor-patient relationship itself that inhibits asking questions.

There was only 1 non-native participant in Study Two, but this subject had incredible difficulty in following the physician's long and involved instructions for testing the presence of blood in the bowels. In an incredible act of grounding which was tape recorded for this study, this physician asked enough questions to ascertain that the patient did not even understand the words "bowel movement"

and proceeded to explain this repeatedly until the patient understood the instructions. This patient correctly recalled the information 4 days later.

In Study Three, non-natives performed significantly worse than other subjects. In one outstanding instance, a non-native insisted that he had "perfect" English when asked by the researcher if he was a native English speaker. This same subject asked many questions about how he was to take a bath with the ace bandage on his ankle (the bandage being an instruction given in this study). When asked later to recall the instructions, the ONLY thing he remembered was that he had asked about bathing; he did not recall any other instruction.

These illustrations about non-native English speakers point out that there are several problems to be addressed to best serve the needs of this population. The physician must assume that the patient does not have good English language skills until given evidence to the contrary. It must be remembered that for many of these patients, pride will not permit the asking of questions or the appearance of not understanding what the doctor is saying. Repetition and questions from the doctor would serve to establish that the patient had indeed understood the directions. For some, it may be necessary to provide clearly written instructions.

From both the literature review and the survey of physicians and patients, it is apparent that written instructions are a good supplement to oral instructions for nearly ALL patients, native and non-native alike. Although many physicians provided occasional written instructions for their patients, most do not do so routinely. Patients, however, overwhelmingly reported the desire to have a written supplement to back up the oral instructions of the physician. These written instructions cannot and should not take the place of the face-to-face doctor-patient encounter, but they can be used to provide a needed reference sheet to help avoid the health hazards inherent in forgetting or mistaking a medical instruction. Sheets with standard, typical instructions for conditions commonly treated by a physician could be kept on hand. It is also possible to develop computer software that has instructions cued by insurance coding on the patient sign-out sheet. When the receptionist signs out a patient, these codes could call up a sheet of patient-specific instructions that could be printed at the check-out desk.

One final issue needs to be mentioned. Often in the course of research, one incident stands out for the researcher quite strongly. In these studies, this incident occurred during the clinical study, Study Two. The

researcher was interviewing a male subject in the immediate recall condition. This student had broken his foot and came hobbling out of the physician's office. He was more than willing to recall his instructions but asked the researcher to hold his large envelope of x-rays while he adjusted his crutches. He proceeded to recall only that the physician told him to consult an orthopedic surgeon immediately. Later, while transcribing the physician's actual instructions to this patient, the most outstanding instruction was that the patient should be sure and carry his x-rays to the orthopedic physician. Less than 5 minutes later, this student could not verbally recall that he had been told to carry his x-rays, BUT HE HAD THE X-RAYS IN HIS HAND. This incident clearly illustrated the theory that procedural memory, memory that is encoded for future action, may not be encoded in the same linguistic manner as memory encoded for future verbal recall (cf. Koriatic, Ben-zur, & Nussbaum, 1990). This student provided visual and verbal evidence that he had indeed encoded and carried out the doctor's instruction, yet he could not verbally recall this instruction 5 minutes after the medical consultation while in the very act of carrying out the instruction.

The above incidence forcefully brought home the concept that one must never assume too much: After earnestly

endeavoring to study the recall of oral instructions, could it be that we were not measuring what we thought we were measuring? It must be remembered that memory has many components, many if not most of which are not yet fully understood. The phenomena of understanding an oral instruction involves encoding not only sounds, but meaning. This meaning may well be a message "to do" rather than "to remember and be able to recall orally". All of the cited research on memory for medical instructions has based the rate of recall on written or oral recall of instructions. A more appropriate measure of recall may well turn out to be what percentage of instructions were actually carried out, rather than verbally recalled. This question begs to be researched further. One possible avenue of researching this question would be to conduct a study similar to the clinical study done for the current research with the addition that the physician's transcripts be transcribed BEFORE the subject is interviewed in 3-4 days. After the subject has recalled the instructions as well as possible, the researcher can then use the actual transcript to question the subject about what he or she actually DID. This would allow a comparison of verbal memory to procedural memory (actual procedures carried out).

In closing, the following practical and policy

considerations need to be addressed by the research community interested in medical communication, by medical training institutions, and/or by physicians themselves:

1. The training of physicians in medical communication skills should be considered an urgent priority both in medical schools and in courses of continuing education for practicing physicians.
2. Special care should be taken by physicians to avoid usage of medical terminology in their consultations.
3. Physicians need to ascertain the language skills of patients before giving instructions, especially with non-native speakers.
4. Physicians should supplement oral instructions with written instructions to which the patient may later refer. These instructions should be written in clear and concise lay terminology.
5. The possibility should be explored for devising software that would coordinate routine instructions with insurance diagnosis codes and produce a written instruction sheet for the patient upon checkout from the doctor's office.

6. Physicians should repeat vital instructions several times in the course of the consultation and ask for the patient to repeat these as well.
7. Researchers should address the issue of procedural memory in the context of remembering medical instructions, keeping in mind that the patients' verbal recall of instructions may not accurately reflect all the items encoded "to do".

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APPENDICES

APPENDIX ONE

SAMPLE OF CLINIC EVALUATION FORM

Name: _____

Medical Survey Questions

1. What is your overall impression of the medical services available to students here at U.T.?

Circle: 1 2 3 4 5
 very poor average good excellent
 poor

2. What is your opinion of the way your physician communicated with you?

Circle: 1 2 3 4 5
 very poor average good excellent
 poor

3. Did your physician use any medical words that you did not understand?

Yes No

4. On the whole, in comparing the doctors and services at UT clinic to physicians you see elsewhere, how does this clinic rate:

Circle: 1 2 3 4 5
 Terrible Below Average Above Superior
 Average Average

5. Do you have suggestions for improving the way the doctors here at UT health clinic communicate with the patients?

APPENDIX TWO

TRANSCRIPT OF EXPERIMENTAL PROTOCOLS

GROUPS 1 AND 2

You have a severely sprained ankle. I want you to rest the ankle and stay off of it for a week. Don't put any weight on it and use crutches. Any time this week that you are sitting down, I want you to elevate your foot on a stool or another chair. Compression will help the swelling, so get an ace bandage and wrap your ankle really well for a week. Keep it wrapped from the time you get up until you go to bed but don't sleep in the ace bandage. For swelling and pain, you should put ice packs on the ankle for today and tomorrow. After tomorrow, you can switch from ice to heat and soak the ankle in very warm water with epsom salts in it. If you need to take anything for pain, take 2 regular strength ibuprofen every 6 hours with food or milk, not on an empty stomach. If not better in a week, call or come in. [For Group 2 the following sentence was added: Please repeat these instructions to me now.]

GROUP 3 INSTRUCTIONS

You have a severely sprained ankle. The standard treatment for such sprains is called R.I.C.E. That's RICE, just like the food. The R is for rest: you need to rest the ankle and stay off of it for at least a week. Don't put any weight on it; you'll need to use crutches. The I in RICE is for ice and ibuprofen. For pain and swelling, you can put ice on the ankle for the next two days; for the rest of the week, soak the foot in very hot water with some epsom salts in it. If needed, you may take 2 regular strength ibuprofen every 6 hours with food or milk, not on an empty stomach. The C in RICE is for compression. For swelling and pain, wrap your ankle really well in an ace bandage this week, from the time you get up until you go to bed, but be sure not to sleep with it on. The E in RICE is for elevation. When you are sitting down this week, raise the foot on a stool or another chair and keep it elevated. So your treatment is RICE and call or come back in a week if it's not better.

VITA

Patricia Bardill Hinton was born in Knoxville, Tennessee in 1946, where she attended local schools, graduating as valedictorian from Young High School in 1964. After graduation and marriage, she lived and worked as a homemaker, secretary, and piano teacher in Georgia, attending Georgia College in Milledgeville, Georgia, and obtaining an Associate of Science Degree from Brunswick Junior College, in Brunswick, Georgia, in 1972. She moved to Knoxville, Tennessee, in 1982 and began studying psychology at the University of Tennessee in 1986 where she graduated summa cum laude with a Bachelor of Science in Academic Psychology in 1987. She entered the Ph.D. program in experimental cognitive psychology in 1988 with an emphasis in health psychology, during which time she taught introductory, biological, and research psychology undergraduate classes. She graduated in 1992 and is currently assistant professor of psychology at Knoxville College, Knoxville, Tennessee.