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Visualizing communication patterns among expert and novice counselors

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Abstract

This study presents a method for visually studying professional communication patterns. Thirty verbatim transcripts of conversations between professional counselors and their clients were coded using Qualitative Data Analysis software. The visualization tools within the program were then used to create a coloured text portrait of each conversation. Text portraits were compared across counselors based on experience level. This method of studying communication patterns during in-situation conversations appears to be both powerful and effective in revealing patterns and relationships within communication events. Advantages of graphic display over traditional statistical methods are considered.

A challenge for researchers in the area of professional communication is how to capture communication events in order to study and improve them. This study presents an innovative method for the analysis of two-person professional/client dialogues in a psychotherapy context using Qualitative Data Analysis software (QDA).

In an attempt to minimize adverse events from poor communication, researchers have used a number of methods to study message sequences between professionals. For example, Reader, Flin, and Cuthbertson (2007) used high-fidelity simulators to investigate communication skills among intensive care teams during simulated emergencies. Using professional raters to assess skills, they concluded that effective communication improves technical performance, but they noted that there remains the requirement to isolate the specific communication skills that are correlated with positive outcomes during specific critical care events (p. 735). Audiotape analysis has also been used to study communication

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patterns. One such study analyzed audio-taped communications of physicians and associated the patterns with patient satisfaction. Using cluster analysis—statistically classifying observations into mutually exclusive groups—in order to separate homogeneous groups of communication patterns, these researchers concluded that patient satisfaction was highest for the group that included a mix of social and medical discussions (Roter et al., 1997). Citing the importance of communication for physical therapists, Roberts and Bucksey (2007) video taped first-sessions with patients and analyzed them using the Medical Communications Behavior System (MBCS) and descriptive statistics. These authors concluded that, while they were able to measure verbal communication, limitations such as background noise, the presence of the camera, and lack of sensitivity of the MBCS made it impossible to to acurately identify patterns of communciaton with this method (p. 590).

Communication researchers have consistently noted the relative ease of documenting the frequency of communication skills and using statistical methods to demonstrate differences between groups. However, these methods have fallen short of the desired goal of evincing patterns within the communications (D'Andrea, Waters, & Rudd, 2011). For example, several researchers have attempted to isolate aspirational patterns of communication and sequences by comparing experts with novices. Studying how professionals differ from novices based on response frequency alone leaves summary statistics (ANOVA, MANOVA, t-tests) as the only means of describing group differences. This point was made clear by aviation safety researchers who used Cockpit Resource Management (CRM) to code and study communication sequences in simulated flight tasks. These researchers reported that studying the process by which a crew communicates, as opposed to traditional frequency counts of communication, revealed strong differences in effectiveness that would have gone unnoticed if only frequency counts were studied (Bowers, Jentsch, Salas, & Braun, 1998). These researchers pointed out that studying the sequence of communication patterns revealed strong differences in the speaker patterns of high and low performing teams, not the simple frequency counts (p. 672), prompting some researchers to suggest looking beyond discrete data points and into pattern analysis. Summary statistics are by no means unusable in communication studies; significance testing is the most frequently used decision strategy in communication research (Levine & Hullett, 2002, p. 614). However, the binary answers offered fall short when it comes to understanding patterns. One alternative to using summary statistics, which has been supported by the surge in availability of large and public datasets, including those generated from social media and government websites, is the develop-

ment of sophisticated data visualization tools (Hidalgo & Almossawi, 2014).

Until now, public databases of private counseling sessions, for example, have not been available. As the open access movement goes from scholarly interest to mainstream curiosity, "the traditional walls and gates of control have begun to fall " (Sévigny & Flynn, 2011, p. 3), and research into these and other heretofore private conversations is now possible. As these large data sets become more available, methods of consuming and understanding the complexity of the information are becoming more and more graphically oriented (see DataVita for more than 100 million examples of data presented visually). New methods of visually representing conversations and studying them in terms of timing, sequence, and structure might be what are needed to uncover the meaningful differences between levels of competence in fields that rely on efficient and effective communication for favorable outcomes. This study focuses on therapeutic two-person conversations between professional counselors and their clients. The goal of studying the complex interaction of a counselor with their client is to identify communication patterns that may be applied to professional-client dialogues in other contexts, such as doctor-patient or lawyer-client conversations. By creating a visual display of the communication patterns that take place between different levels of counselor experience and their clients, we demonstrate the potential of visually analyzing graphically rendered communication patterns between professionals in any area where the desired outcome relies on effective communication. To the extent that we can improve methods of capturing communication progressions, we might eventually succeed in isolating recurrent patterns of interaction that are associated with the most positive outcomes.

Hypotheses

The purpose of this study is to investigate the potential for using the visual tools available in Qualitative Data Analysis (QDA) software to capture counseling conversations as they would appear if they were presented as a visual rendering of an event in time that could be studied and compared. It was hypothesized that differences in frequency, sequence, and pattern of skill-use would be evident upon visual inspection of the text portraits. It was further hypothesized that statistical comparisons of average skill use would yield meaningfully different results than would visual inspection of the data.

Session transcripts

Transcripts available in the Alexander Street Press database (http://www.alexanderstreet.com) were used to compare skill use among counselors with varying levels of experience. The database includes a searchable collection of actual counseling and psychotherapy sessions that highlight the experience and treatment of psychological stress at all levels up to and including diagnosed mental illness. The treatment of these problems is demonstrated by a mixture of therapists with varying levels of experience using a variety of theoretical approaches. The database currently has approximately 83,200 pages of material, including more than 20,000 pages of session transcripts, more than 37,000 pages of client narratives, and more than 25,000 pages of secondary reference material. This collection made it possible for us to search for counselors that met the criteria we were looking for, namely years of experience doing therapy, so that we could study the patterns in each level. The purpose of using experience level as a variable was twofold. First, to see if there were differences in skill type and use between expert and non-expert counselors. Second, to see if we could capture the type, frequency, and timing of each skill-using the visual tools available in the coding software.

We selected 30 transcripts—ten from each experience level. Each transcript was a single, approximately one-hour-long conversation between a counselor and a client. The Level III counselors were peer-identified expert counselors included in the DVD collection *Psychotherapy with the Experts* (Pearson Education), which is available within the Alexander Street Press database described above. The experts were as follows: Insoo Berg, James F. Bugental, Mary Goulding, Kenneth V. Hardy, Allen Ivey, Jeffrey Kottler, Steven Madigan, Donald H. Meichenbaum, Natalie Rogers, and Ernest Rossi—all well-known figures in the field of counseling. Level II counselors had between ten and twenty years of experience, and Level I were those with ten or fewer years of counseling experience.

The sessions represented the following types of counseling: brief, cognitive behavioral, pharmacotherapy, integrative, person-centered, family systems, solution focused, narrative, transactional analysis, existential humanistic, and mind-body orientations. Seventeen therapists were female and thirteen were male. Fifteen sessions were conducted by PhDs, six by MAs, five by MDs, one by an Ed. D., and two by MSWs; one therapist's degree was not given.

Verbal Response Category system

In order to study the verbal response behavior of counselors with different experience levels, we selected the Counselor Verbal Response Category system developed by Clara Hill (Hill, 2004; Hill, Thames, & Rardin, 1979). Citing limitations of the existing response systems at the time, Hill incorporated aspects of 11 different category systems in order to address the shortcomings of each and create a verbal response system that would allow for the measurement and description of counselor verbal behavior (Hill, Thames, & Rardin, 1979, p. 466).

The fifteen response categories are well defined and mutually exclusive, allowing for the relative ease of categorization of counselor responses by observers. The specificity of each skill does not preclude the general-use nature of each counseling skill across theoretical orientations (Hill, 2004). This was a critical factor in our decision to select this particular skill category system, as we were focused on variances related to experience level of the counselor, irrespective of orientation. The response categories are as follows (the number codes are in parentheses): approval and reassurance (1), closed questions (2), open questions (3), restatement (4), reflection of feeling (5), challenge (6), interpretation (7), self-disclosure (8), immediacy (9), information about the process of helping (10a), facts, data, or opinions (10b), feedback about the client (10c), process advisement (11a), directives (11b), other (12) (Hill, 2004).

Documents are available from http://pubs.apa.org/books/supp/hill3/. Web Form E (http://forms.apa.org/books/supp/hill3/pdf/student/webforme.pdf) provides the name of each response category and a definition, followed by several examples of the responses appropriate for that category. Instructions for unitizing the text and a practice transcript are also provided (Web Form F) so that users can practice unitizing and coding transcripts in order to establish a suitable level of rater agreement. Hill suggests a minimum kappa level of .60 to establish adequate inter-coder reliability (http://forms.apa.org/books/supp/hill3/pdf/student/webformF.pdf). Kappa was used in this case in order to exclude chance agreements (Cohen, 1960).

Procedure

Our research team consisted of one licensed mental health counselor and two advanced doctoral students in the process of obtaining licensure. Before coding the study transcripts, we practiced using the Hill's (2004) helping skills system for approximately 45 hours until we achieved an average inter-coder reliability (kappa) of .81 for the three raters across the 15 helping skills. Once we reached an acceptable agreement level in terms of unitizing and categorizing each skill, we independently hand-coded each unit of the counselor's speaking turn within each session transcript. A total of 30 counseling sessions were coded this way. After each transcript was completed, we met to discuss any discrepancies in coding until we arrived at an agreement on the placement of the code into a skill category. When the set of 30 session transcripts were coded and finalized, they were entered into a Computer Assisted Qualitative Data Analysis Software (CAQDAS) program, machine color-coded, and analyzed.

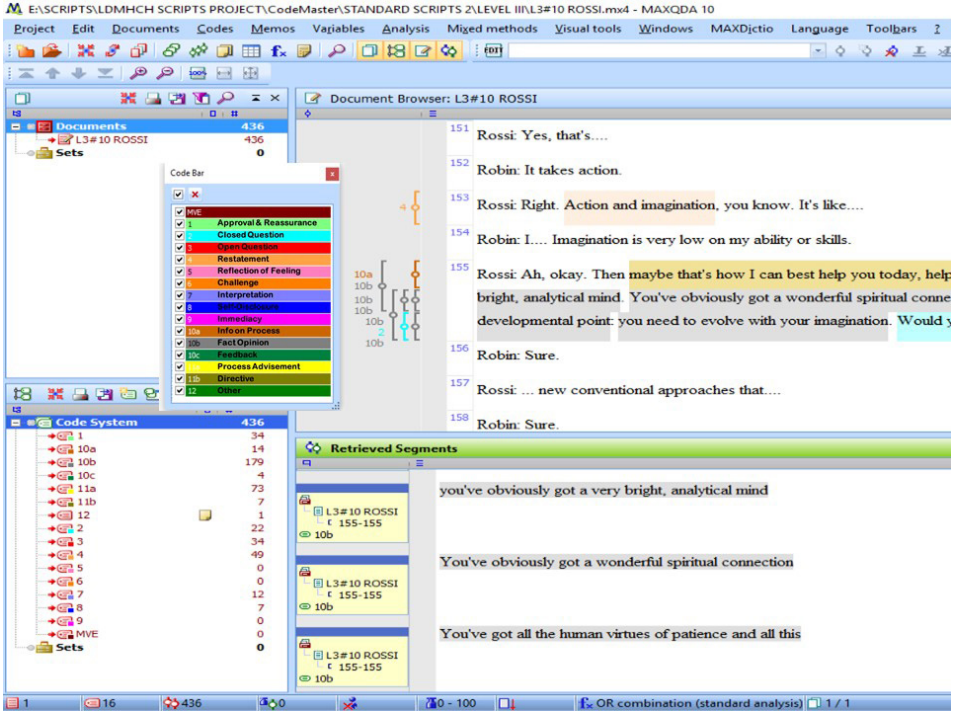
Data representation

Software to analyze qualitative data was first developed in the early 1980s, and basic packages were available by the late 1980s (Fielding, 2000). This early software was limited to basic frequency counts of occurrences within a corpus of qualitative data. This limitation made traditional statistical comparisons the only replicable way of analyzing the data. More recently, Computer Assisted Qualitative Data Analysis Software (CAQDAS) is used for its text retrieval and database capabilities. The acronym CAQDAS was presented at the first Surrey Research Methods Conference in 1989, which focused on using software designed to analyze qualitative data (Lewins & Silver, 2008, p. 6). Since that time, these types of computer programs have developed to include text retrieval and database capabilities as well as many options for visually displaying data. To our knowledge, this is the first time CAQDAS software has been used to study the communication behavior of professional counselors.

The data in the present study were created using MAXQDA[10], a proprietary, professional software package for qualitative and mixed methods data management and analysis (MAXQDA, 2014). The software records frequencies of unitized or quantized data and provides visual displays of individual

and overall data elements, specifically text portraits. Each portrait graphically represents a visual map of all the coded skills used during a counseling conversation. The display shows not just how many skills were used, but how and when—that is, in what combination, order, and duration the skills were used. This permitted rapid comparison within and between levels of experience. The software also allows for subsequent searches in the transcripts for specific words, phrases, or themes of interest. Figure 1 shows an example of the MAXQDA[10] dashboard.

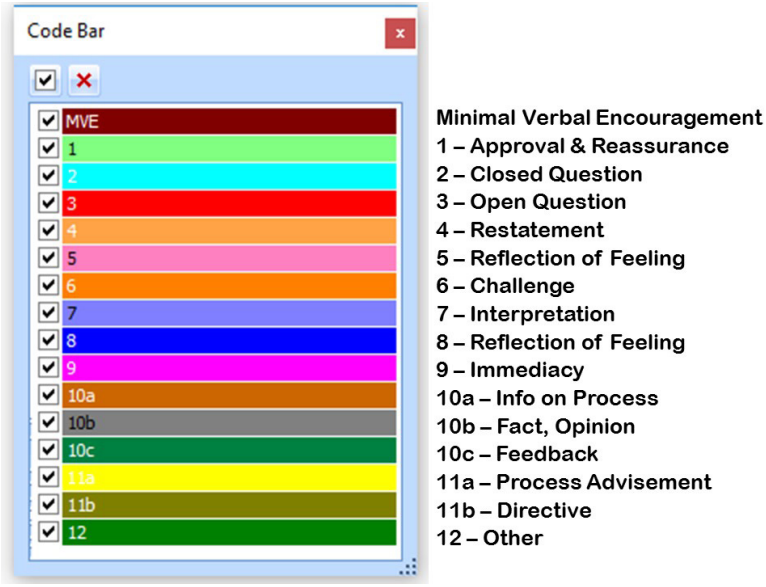
Figure 1: MAXQDA[10] Code Bar, Code System, Document Browser, and Retrieved Segments.



The top left window of the MAXQDA[10] display identifies which documents and code sets are in use. The top right window is a line-by-line coded transcription of the text document. The lower left window displays the code system and individual code elements with cumulative totals of coded units. The lower right window displays individual retrieved coded segments. These segments can be sorted and studied if certain content or themes within the transcripts are the focus of study.

MAXQDA[10] was selected mainly because of the visual tools available in the program. Specifically, the document portrait function creates a picture of all the coded segments, or skills, based on the order and colors of the codes. Since a different color is assigned to each skill category, one can clearly and easily see which skills are used in each session and in what sequence. Figure 2 shows the color assignments for the Helping Skills displayed in the MAXQDA[10] Code Bar.

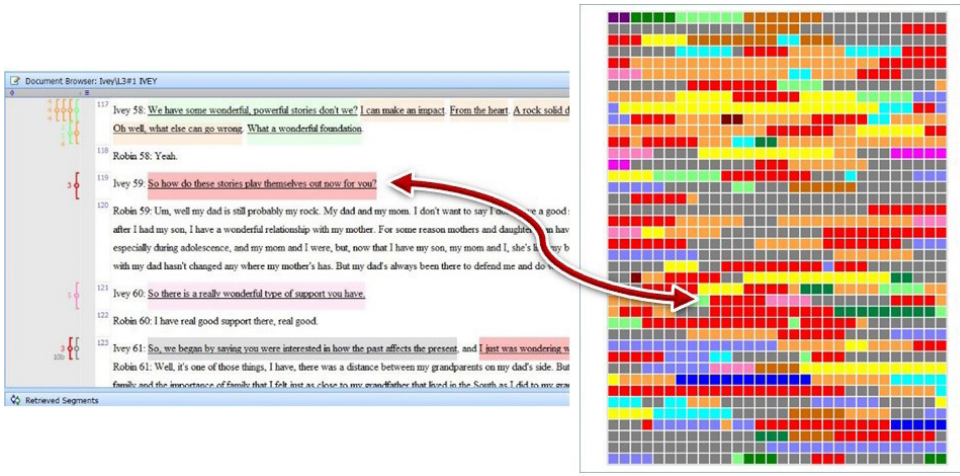
Figure 2: MAXQDA[10] Code Bar color assignments.



For example, if a counselor asks an open question (Skill 3, coded red), and then immediately after asks a closed question (Skill 2, coded aqua blue), one can easily identify this sequence in the portrait. If the counselor provides facts, data, or opinions (Skill 10b, coded gray) for most of the session, the portrait will be dominated by the color gray. The immediate skill pattern recognition is valuable, because no recalling or rewinding is needed—the entire session is viewable in one glance. In the portrait view, the colors are displayed in a matrix with 1,200 squares arranged in 30 rows of 40 squares each. All 1,200 squares are divided proportionately among coded segments. For example, if there were only two coded skills, 600 squares would be one color, and 600 would be the other color. Seeing the picture of the entire counseling session allowed side-by-side comparisons of the skill type and frequency of counsel-

ors at different experience levels. MAXQDA[10] does this by creating a picture of all the coded segments based on the order and colors of the codes. Figure 3 shows a side-by-side comparison of a line-by-line coded transcript and the associated text portrait in a 30x40 matrix.

Figure 3: Color-coded transcript with associated text portrait.

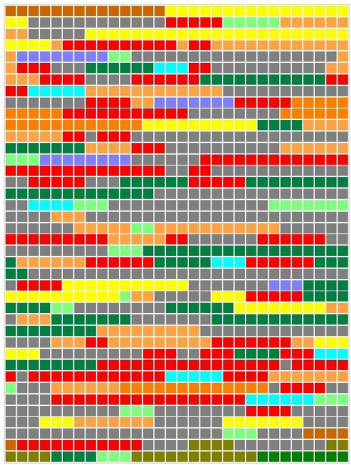


The color-coded text portraits can be displayed and examined in two different formats. The first format is a representation of only the counselor's verbal responses for the entire session. This display, or perspective, represents the skills the counselor used throughout the session.

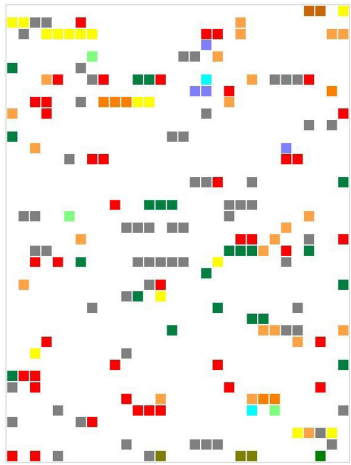
The second format represents the color-coded elements of the counselor's verbal responses, as well as the units of time in the session when the counselor was not speaking, but listening , i.e., when the client was speaking. This display or perspective represents the relative time that each participant spent talking.

Figure 4 shows counselor-speaking units only compared with counselor-speaking and counselor-listening (client-speaking) units in the same session. Since the focus of the study was on the particular use and timing of counselor skill-use, the client's side of the conversation was not coded.

Figure 4: Counselor-Speaking portrait (1a) and Counselor-Speaking and Listening portrait (1b).



1a



1b

Data analysis

The data consists of raw frequency counts for individual use of 15 counselor verbal response modes during a complete counseling session, e.g., SK1 through SK9, SK10a, SK10b, SK10c, SK11a, SK11b, and SK12. Frequencies were aggregated by skill for each Experience Level. Additional data were drawn from the individual text portraits produced by MAXQDA[10]. The counselor-speaking portrait yields the proportion of the session in which the counselor used a given skill moment by moment. The counselor-listening/client-speaking portrait yields the amount of time the counselor used a given skill as a proportion of the overall counselor/client interaction.

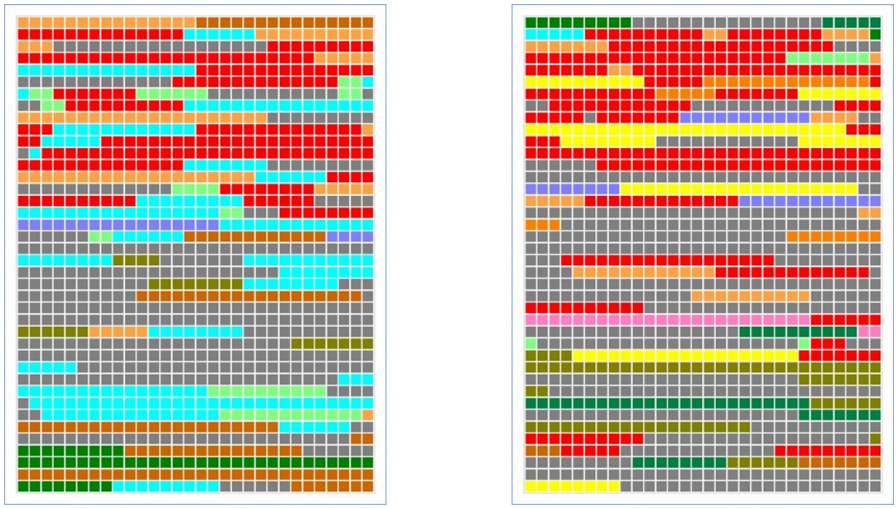
Support for the first hypothesis that qualitative phenomena such as therapeutic conversations can be captured as they unfold using visual software was tested by visually inspecting the text portraits generated by MAXQDA[10].

In order to test the second hypothesis related to statistical conclusions, non-parametric analyses were used, as preliminary examination revealed unequal *ns* for the 15 response categories in the individual session transcripts. Some counselors used more or fewer verbal response modes than others, and some sessions were of slightly longer or shorter duration than others.

Skills

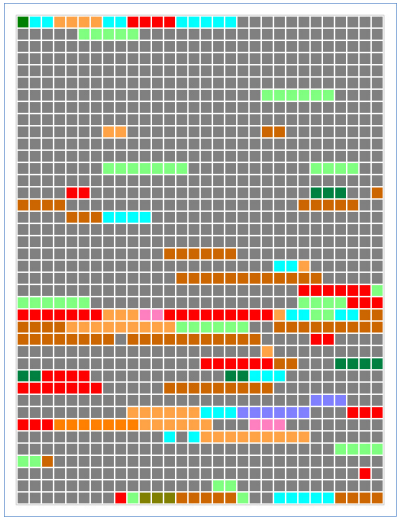
Individual session transcripts were "unitized," i.e., broken down into verbal response units, following the guidelines of the Hill Helping Skills System (Hill, 2009). These units are grammatical sentences spoken by the counselor. The unitized transcripts are "coded" in accordance with an identified skill set, allowing comparison of counseling skill-usage within and between levels. A total of 6,206 counselor response units (sentences) were analyzed across three experience levels. Both portrait and statistical analyses revealed no differences between Level I and Level II counselors, and so Level II counselors were left out of further analyses. The most frequent responses (percentage-wise) across all levels were *open questions* (coded in red) and *providing facts, data, or opinions* to clients (coded in gray). See Figure 5.

Figure 5: Sample text portraits showing the two most-used skills across all levels of experience: *open-ended questions* (red), and *providing facts, data, or opinions* (gray).

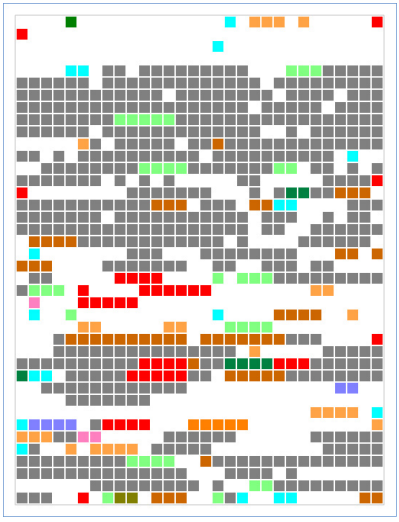


To answer the question of whether there are identifiable differences between expert and novice counselor communication patterns, we compared portraits across all levels. Here, we present examples of the differences in profile. Figure 6 presents two sets of portaits to illustrate representative findings.

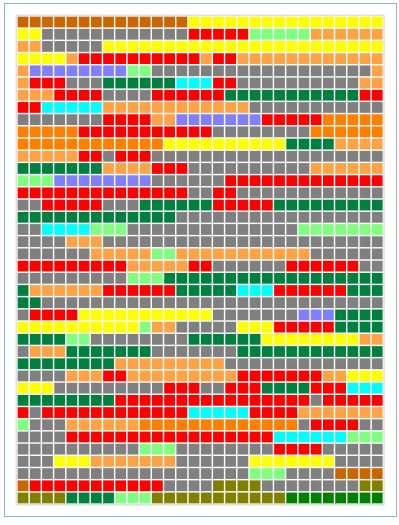
Figure 6: Text portraits comparing novice (a1 and a2) and expert (b1 and b2) communication patterns.



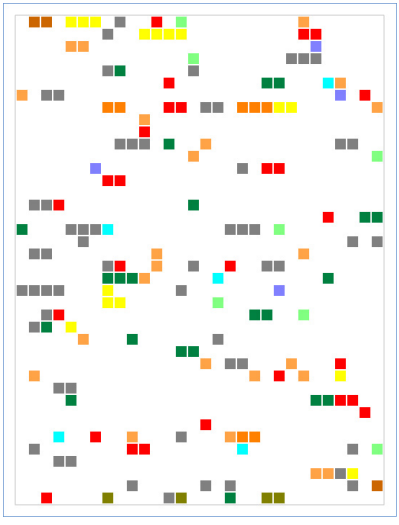
a1



a2



b1



b2

As can be seen, the patterns appear to differ mainly in terms of the variety of skills used and amount of time the counselor talked during the session. The novice patterns (a1 and a2) show limited skill-usage throughout the session, as evidenced by the limited number of colors. The predominance of gray in the novice speaker-patterns suggest that less experienced counselors rely on *providing facts and opinions* to their clients, where experts tend to do less of that and more *process-oriented* work (yellow and orange signify interactive skills). These patterns suggest that expert counselors get more information from their clients than they give; for novices, it is the other way around. Notice also, there is more of a talk/listen balance in the expert session. This pattern was consistent across the sample of conversation portraits.

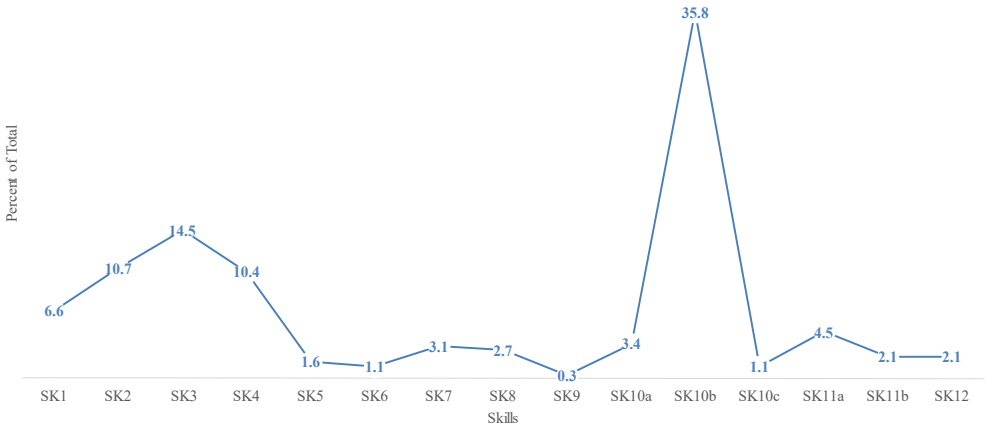
The statistical analysis of this data serves as an example of the limited use of difference-statistics in understanding communication sequences and patterns. A non-parametric Mann-Whitney U, using the level of the therapist as the independent variable, showed significant differences between experience levels on restatement, shown as orange in the portraits above ($Z = -2.16$, $p = .029$, $r = .68$); *interpretation* (light purple) ($Z = -2.62$; $p = .007$, $r = .83$); and *process advisement* (yellow) ($Z = -3.57$; $p = .001$, $r = 1.13$). See Table 1 on the next page for all skills compared across experience level.

Table 1

Skill	**Mann-Whitney U**	**Z**	**Asymp.Sig. (2-tailed)**	**Exact Sig.**
Approval/Reassurance	33.500	-1.252	.210	.218
Closed Questions	33.000	-1.286	.198	.218
Open Questions	29.500	-1.554	.120	.123
Restatement	21.500	-2.157	.031	.029
Reflection of Feelings	50.000	.000	1.00	1.00
Challenge	34.500	-1.217	.223	.247
Interpretation	15.500	-2.619	.009	.007
Self-Disclosure	44.000	-.730	.466	.684
Immediacy	47.500	-.234	.815	.853
Helping Process Info	36.500	-1.026	.305	.315
Facts, Data, Opinions	45.500	-.340	.734	.739
Feedback About Client	40.500	-.726	.468	.481
Process Advisement	3.000	-3.574	.000	.000
Directives	30.500	-1.549	.121	.143
Other	46.000	-.306	.759	.796

Frequency of skill-use was highest for experts across the board, and effect sizes were considered strong (Sprinthall, 2012). Using each demographic as the independent variable, Chi square analyses revealed no significant differences between gender, school (type of therapy), or degree held by the therapist for any of the skills measured. The two most frequently used skills, regardless of experience level (across all three levels), were *asking questions* and *providing facts, data, or opinions* (Figure 7). (N. B. Because of the unequal session lengths, the frequency of each skill has been converted to a percentage.)

Figure 7: Amalgam of Skill Frequencies for the total sample (N = 30)



Data analyses included quantitative analysis of the aggregated data to address the hypothesis that skill-use patterns would differ by experience level, and visual analyses were done to assess the potential for graphically representing communication as it takes place.

The hypothesis that experts differ from novices in terms of type and frequency of skill-use was supported. Visual inspection of two-person exchanges in a therapeutic setting revealed discernible differences between therapists with varying years of professional experience. Experts appeared to use more varied skills per session, talked less, and tended to communicate more about work to be done in session (as opposed to sending the client home to work on their own [yellow]). This conclusion is based on interpretive visual analysis of the communication patterns, rather than on statistical outcomes; these findings emerge directly from the text. According to the statistical tests, novice counselors differ from experienced counselors only in terms of three skills (*restatement*, *interpretation*, *process advisement*), with professionals having higher frequency of use. Relying solely on statistical outcomes, one could assume that to become an expert counselor, one would only need to increase the use of these three skills. Clearly this is not the case. Statistics cannot represent the human aspect of communication events by the sheer fact that statistics represent summary scores. It is only by identifying profiles of effective communication that we can understand how effective professional communications unfold in a context.

The second purpose of the study was to evaluate the potential of using computerized visual tools to capture communication patterns during in-situ-

ation therapeutic conversations. The results are promising. This study demonstrated that communication events can be codified and summarized in a graphic display, and that these renderings can be used to study and hypothesize about effective communication among professionals. QDA software allows entire conversations to be studied and compared. As long as a conversation can be recorded and transcribed, any type of communication can be captured and analyzed with this method. In addition to the visual appeal of QDA analysis, the findings reveal several advantages over using only statistical methods, the main one being that we can study how pattern variations in dialogue occur over time. The contribution of this qualitative comparison of observable behaviors in communication is to note the relative presence or absence of particular skills, the most dominant or lacking skills, or perhaps an ineffective use of particular skills during critical communication events.

The skill patterns of novice and expert counselors used in this study are clearly different in terms of the amount of time spent giving and getting information. This finding would not have been revealed by statistical tests alone. In a sense, the visual information revealed more accurate information than did the numeric information. Statistical methods are, by design, formulated to reveal differences between groups, and it may well be the similarities among experts that are most important. This information is easily absorbed by looking at the text portraits and comparing them. The reader does not need to know how to calculate or interpret statistical information—the picture shows the actual data, rather than a summary number describing it. Visual data that represents a temporal image of conversations between people might be a new avenue for professional communication research.

We know from studying expert chess players, for example, that experts have more features in common than are unique (Chase & Simon, 1973). Researchers know this from observing them during play rather than from interviewing them. Asking experts what they do is limited by the fact that they have to talk and process at the same time (Ericsson & Crutcher, 1991; Slone, 2009). By capturing conversations as they occur, the expert is free to organize information and decide which skill to use without interference from the effort to explain and describe their thought process (Ericsson, 2002). Once the context and associated skill choice are codified, the pattern of the conversation becomes visible, and we can develop expert profiles to use for study and training. It is conceivable that trainees could transcribe and code their own interactions and compare their patterns to those of experts. With a pattern to model, the learning process might be more efficient than providing novices with a vague description of skills that could be used. After-the-fact incident review is

common, as many live conversations are now recorded (telephone conversations, cockpit exchanges, emergency service calls, etc.) and visualization tools might have the potential to offer new insights into patterns of communication that are more or less effective during a given situation. Once effective patterns are associated with positive outcomes, those patterns can become the teaching tool for specific situations.

Limitations

While it makes sense to study highly regarded therapists as experts and assume that what they do can be modeled, effectual human communication has a certain artistry to it that cannot be measured, counted, or coded. The quality of the relationship between people, for example, is consistently identified as a key ingredient in positive feelings about verbal encounters, and this was not accounted for in this study. Future research might include a relationship assessment as a way of isolating the effect of relationship quality on skill choice during professional encounters. Related to this point is the fact that the outcome or effectiveness of the skill-use patterns was not measured or studied. Perhaps future research can focus on patterns of communication that are associated with specific desired outcomes, such as the successful emergency landing of an aircraft or successful hostage negotiation. There are likely many ways to communicate effectively, and no single pattern will apply to all situations. However, effective patterns probably share certain features.

It should also be noted that peer-identified experts may be those professionals that are more active in national organizations and are therefore more well-known. Professional therapists that publish articles, books, and video tapes are more likely to be regarded as experts by their peers because of their fame rather than their superior skills. Additional research could focus on defining expertise in a given field by evaluating variables besides just professional recognition.

Summary

CAQDAS technology and the procedures used in this study could provide an additional layer or degree of objectivity, or at least confidence, in the evaluation of competencies related to how professionals communicate.

With a credible skills model, trained judges attaining highly reliable inter-rater reliability, and an intuitively obvious documentation and display technology such as MAXQDA[10], more detailed and more comprehensive examinations of dialogue are possible.

While it may be tempting to use numbers to describe communication data, this study confirmed that it is possible to use visualization tools to capture conversations in their entirety and to pick out patterns that are associated with various amounts of experience. While no objective measure of differences can be made from a qualitative analysis of these data, certain subjective observations can be made. Scientific visualization programs have been acknowledged as the next generation of tools for the study of the massive amounts of communication being generated each day. It has been estimated that at least fifty percent of the human brain is devoted to capturing visual information. Therefore, visual images are faster and easier to absorb than text (Smiciklas, 2012). Graphic data displays capture not only temporal sequences of communication, but also real time events that can help us study and improve professional communication in all areas.

Isolating skills that might be predictive of expertness could form the basis of education or training so that novices could have a visual presentation of what they are aiming for as they move from novice to expert. Expertise may extend beyond currently identifiable skills; it may extend to emerging concepts of expertise in terms of personal or interpersonal qualities or patterns of thinking and decision-making. Results of this study seem to indicate that those qualities could also be captured with the visual tools available in qualitative software.

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