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Conversation Analysis of Repair in Interaction with Adults who Have Acquired HI

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Introduction

This chapter presents a summary of some recent research which has been undertaken to address the patterns of conversational behaviour in interaction involving adults who have post-lingual hearing impairment (HI). The purpose behind this research is to develop a clinical assessment and intervention protocol for assisting HI adults and their conversation partners in reducing the impact of conversation breakdown and its repair in everyday talk.

Lind (this volume) lists various conversational behaviours which arise in the conversation of HI adults and which have been identified by the authors as being maladaptive. Each of these behaviours may evolve to be a genuine target for intervention. However, at this point, the patterns of most of these behaviours as they are influenced by one person's HI are not yet well enough understood nor are they yet clearly distinguished from the same behaviours as they occur in conversations not influenced by HI. Until evidence of their patterns of occurrence and their sequential consequences is established they cannot readily be translated into goals for assessment or intervention.

Amongst these behaviours, conversation repair has been the most commonly identified therapy target, for two reasons. First, it is the only one of these behaviours that can be identified a priori as a problem for conversational fluency. Repair is by its very nature the result of a breakdown in mutual understanding in the conversation. Participants' attempts to resolve the breakdown in

the immediate environment in which it occurred speaks to the importance to the talkers of re-instating mutual understanding. Second, there is now a growing body of research that identifies the patterns of repair as they may be influenced by post-lingual HI. The common sequential behaviours in one particular type of repair were outlined briefly in Lind (this volume). Two additional examples are provided here also.

This series of projects from our recent research has been designed as the early stages in an attempt to address the foundation issues in conversation-based therapy; a model of therapy in which clinical tasks directly address conversation difficulties arising as a result of one participant having a post-lingual hearing impairment. The studies have been designed to address key questions about the clinical patterns of repair behaviour, including:

- Can we reliably sample conversation repair?
- Is repair behaviour consistent over time?
- Is repair influenced by intervention? and
- Does repair in conversationally-oriented clinical tasks mirror repair in conversation sampling?

What is Conversation Repair?

Repair is the name given to periods of talk in everyday talk in which miscommunications rise, are noted and then resolved. Commonly these repair sequences occur in the talk immediately following the miscommunication and take up conversation turns until they have been resolved, when participants then return to the topic at hand. Schegloff and colleagues identified seven distinct repair sequences based on the allocation to each participant of the various elements of a repair sequence. These seven repair types may be divided into two broad groups by whether the repair turns are spoken by one

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participant only (within-turn repairs) or by both participants (across-turn repairs). Each repair sequence contains (some or all of the) four elements, the trouble source (the portion of miscommunicated talk), the repair initiator (the talk instigating the repair), the repair (the talk addressing the trouble source) and the repair confirmation (demonstrating revised understanding). Lind, Hickson and Erber (2006) investigated the number of each of the seven types of repair that arose in free and unstructured conversation between familiar participants one of whom had a post-lingual HI in seven conversation dyads.

Repair sequences were classified according to the Schegloff et al taxonomy, each repair sequence also “allocated” to the person uttering the turn that requested or initiated the repair. The assumption is that in “other-initiated, self-repair” (or OISR) sequences, the person who initiates the repair is the person who recognizes the miscommunication has arisen and that in these dyads, this is likely to be influenced by a range of factors, including mishearing as a result of their HI. All things being equal it is the added effect of the HI that increases the likelihood of the asymmetry in repair initiation. Of the seven repair sequences two were found to be initiated by the HI

adult more commonly than by their FCP. The first of these, the 3rd position repair (or 3rd PR) sequence was found to occur only relatively rarely across the seven 20-minute conversation recordings in this study although a very slight asymmetry in initiation was noted between the HI adults and FCPs. By far the repair sequence found to be most “vulnerable” to the presence of post-lingual HI was the “other-initiated, self-repair” (or OISR) sequence which both occurred much more frequently and showed a substantially greater asymmetry in initiation than the 3rd PR sequences in these conversation samples.

Extract 1 provides an example of a 3rd PR sequence in which, during talk about family members’ birthdays, A asks a question in line 9 about “Andrew’s lot” (i.e., his children). In response to this B replies with a commentary about Andrew’s, rather than his children’s birthdays. This line 11 turn is labelled a sequentially non-implicated turn, that is a turn that A does not see as a logical response to his prior talk. A then in line 13 identifies the issue B has responded to “Andrew’s is...” as a repair initiator, and then repairs with a reworded question (“What about his kids?”), to which A responds in line 16 with a repair confirmation in the form of an answer to A’s original question. The key issue in sequences such as

Extract 1. 3rd PR (Position Repair) sequence

Line	Speaker	Repair action	Text
1	A		when’s Cara’s birthday
2			(0.7)
3	B		oh not until: Christmas time next year
4			(0.5)
5	A		yes (0.5) and Jessie [↑]
6			(1.5)
7	B		u::m: October
8			(0.4)
9	A	TS	October (.) what about Andrew’s lot
10			(1.8)
11	B	SNI turn	he’s next week
12			(1.2)
13	A	RI / R	Andrew’s is (.) [what] about his (0.3) kids
14	B		[yes]
15			(2.0)
16	B	RC	they’re all finished (.) January February March (.) one each

TS – trouble source, RI – repair initiator, R – repair, RC – repair confirmation

HI adult’s initial – bolded

SNI turn – sequentially non-implicated turn

Extract 2. OISR (Other-Initiated, Self-Repair) sequence

Line	Speaker	Repair action	Text
1	A	TS	so (1.0) u:m (0.9) if they're going to do that (0.4) that might
2	A	TS	mean that /jə/ know [that] from quite early they're (0.4) from
3	A	TS	quite [early]
4	B	RI	[sorry] (0.3) quietly
5	A	R	from quite early in the year (0.6) they might be um restricted in
6	A		in how much (0.7) other things they want to try and fit into their
7	A		lives=
8	B	RC	=/m:/

TS – trouble source, RI – repair initiator, R – repair, RC – repair confirmation
 HI adult's initial – bolded

these is the monitoring that communication partners need to maintain to check the appropriateness (or “sequentiality”) of their fellow participant’s turns. When one of the participants has a post-lingual HI this monitoring may result in complex sequences of interaction and some overcompensation by the FCP. Thus, although these sequences are much less common than the OISR sequences, they are potentially more stressful for the FCP.

Extract 2 provides an example of an OISR sequence in which A’s turn stretching from line 1 to 3 contains the trouble source which becomes apparent when B interrupts A’s turn to apologise (“Sorry”) and repeat what he thinks has been said (“quietly”). This repair initiation is followed by A’s line 5 repetition of the words in her turn-final phrase (“from quite early”) before extending the phrase and then expanding on her original utterance in lines 5 to 7. The sequence ends with B uttering his understanding via the repair confirmation “/m:/”. This is an example of the sequence most commonly associated with adult HI.

Methodology

Essentially the same methodology was used in each of the studies reported here. Unless otherwise stated, all individual segments and summaries of conversational data were derived from free and unstructured dyadic conversation between familiar conversation partners, most commonly between the HI adult and his/her partner or spouse. All interactions were undertaken in standard speech and hearing clinic settings at Flinders

Medical Centre, in quiet well lit rooms. Conversation was the focal activity during the sessions. Participants were not given a task to complete nor issue to resolve. No restrictions were placed on the content or conduct of the conversation other than to suggest that they use the small number of topic cards provided to help prompt or stimulate conversation if they ran out of topics to talk about. All conversations were audio-recorded and transcribed in full from the digital signal using standard Conversation Analysis (CA) transcription methods. All repairs were identified, classified, again according to CA descriptions. Inter- and intra-transcriber and analyst checks were undertaken in each study, based on between 10 and 15% of the transcribed data in each case. Independent transcription and analysis were found to fall between 83% and 95% across all studies, and importantly, all discrepancies in transcription and analysis were resolved to the satisfaction of the researchers.

All clients in these studies were recruited from the adult cochlear implant program at Flinders Medical Centre, some while still on the waiting list were hearing aid wearers (but commonly receiving little or no benefit from hearing aids and thus applying for implantation) limited benefit from HA, others had been implanted. It is important to note that no comparison has been made between patterns of conversation repair device use in any of these studies. Purposeful sampling was used in all projects. Specifically, participants were included in the research if they, their partner or their audiologists recognised the couple were having difficulty with everyday conversation as a result of one partner’s hearing im-

pairment. Otherwise, inclusion criteria for the adults with hearing impairment were; (a) severe to profound sensorineural HI in the better ear, (b) native Australian English speaker, (c) no reported history of neurological insult or cognitive injury, and (d) no prior experience of conversation based aural rehabilitation therapy. The inclusion criteria for the familiar conversation partners (FCPs) were: (a) communicates regularly with the HI adult, (b) native Australian English speaker, (c) has no reported history of neurological insult or cognitive injury, (d) has no prior experience of conversation based aural rehabilitation therapy, (e) has no reported hearing loss or reported difficulties hearing in conversation, and (f) does not wear a hearing aid. It is of note that whilst in some instances the conversation partner's hearing thresholds were assessed in other projects, researchers primarily relied on self-report of hearing difficulties.

Research Question 1. Reliability of Clinical Sampling of Repair Behaviour

This study comprised the analysis of number and type of repair behaviours arising in conversation samples of four adults with post-lingual hearing loss; two implantees and two hearing aid wearers, each with their chosen familiar conversation partner. Each couple attended Flinders Speech and Hearing clinic on two occasions approximately a week to ten days apart. On each occasion they were asked to participate in two 20-minute conversations following the method described above. Each conversation was transcribed and repairs were identified. The analysis of the occurrence of OISR sequences addressed the question:

Can OISR Sequences Arising in Free Conversation in the Clinic Between Adults with Acquired HI and Their FCPs be Reliably Sampled?

As this question indicates, the focus of this data is on sampling reliability, companion data on validity having been reported elsewhere. Of the seven commonly identified repair sequences, close attention was paid to the OISR sequences following the results of Lind et al. (2004). The first comparison (Figure 1) compared the number of occurrences of OISRs in each of the four conversations by each of the four dyads in the study. A goodness of fit model was applied to the data using the Freeman Tukey 2, which has been identified to be reasonably robust in the face of small numbers and cells

with "0" values. Of the four OSIR data sets, only two (dyads 1 and 4) were found to meet the goodness of fit model. That is, only two dyads were shown not to vary significantly in the number of OISR sequences over the four recordings.

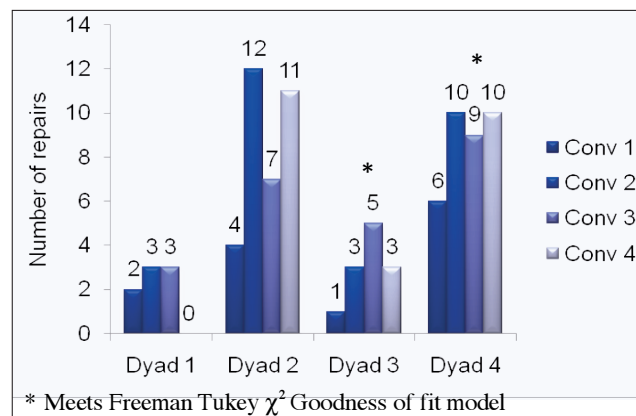


Figure 1. Number of OISR sequences in each of four 20-minute conversations recorded by each of four dyads.

As sample size influences reliability, the same question was posed on the combined results of the two conversation samples conducted on the first visit into one 40-minute sample comparing these with the number of OISR sequences for the two conversations undertaken at the second visit. The same Freeman Tukey 2 goodness of fit model was applied to the resulting two sets of data for each dyad (Figure 2). By contrast with the 4 x 20 minute conversation data analysis, in this case all four dyads' re-

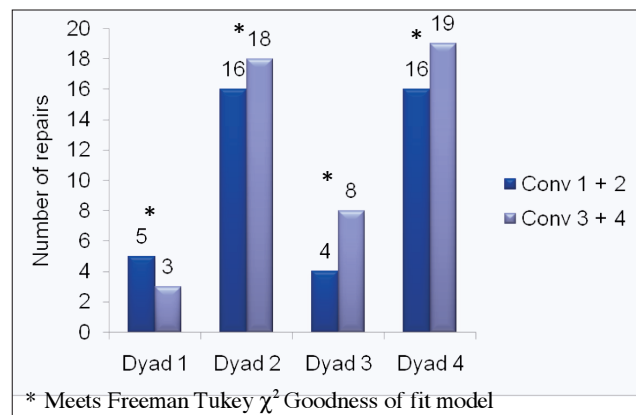


Figure 2. Number of OISR sequences in each of two 40-minute conversations recorded by each of four dyads.

sults were found to meet the goodness of fit model, that is, the number of OISR sequences was found not to vary across the two samples for each of the four dyads.

As a result, initial data analysis on the reliability of repair behaviour in free and unstructured conversation between familiar conversation partners, one of whom has a post-lingual HI, indicates that repair behaviour, specifically the number of OISR sequences does not vary substantially over a short time period and in the absence of intervention. Second, the data suggests that 40-minute samples of conversation are required in order for reliable sampling of OISR sequences.

Research Question 2. Stability of Repair Behaviour Over Time

This study addresses both research questions 2 and 3. This study comprised two case studies, again each involving HI adults and their chosen familiar conversation partners. Participants were selected as they met the inclusion criteria outlined above. Further, one HI adult had been placed on the waiting list for implantation for approximately 12 months (research question 2) while the other was due for implantation soon after the commencement of the study (research question 3). It is of note that these were clinically motivated decisions about implantation not research-based allocation of treatments. The couples each completed a 40-minute conversation on three occasions under the same conditions as outlined above. Dyad 1 undertook the three recordings 3 months apart while remaining on the waiting list and without intervention. Dyad 2 did the first recording immediately prior to implantation and the second and third recordings 7 and 10 months following implantation. The research question posed of the first dyad’s conversation samples was:

Does HI Have an Effect on the Occurrence of Repair in Conversations Involving an HI Individual and His FCP and if So, What Patterns of Repair Typically Occur?

The three conversation samples were transcribed and analysed and the number of OISR sequences summed for each conversation. Further each OISR sequence was allocated to the person speaking the repair initiator as a reflection of their need for clarification. Results for the OISR sequences initiated by each speaker in the three conversation samples are presented in Figure 3. Both the asymmetry in initiation of repair and the consistency of this effect are apparent across all three

recordings and were supported by statistical analysis. In summary, this case study data suggests that quantitative aspects of repair behaviour are consistent over time and thus make repair potentially amenable to the investigation of the effects of intervention.

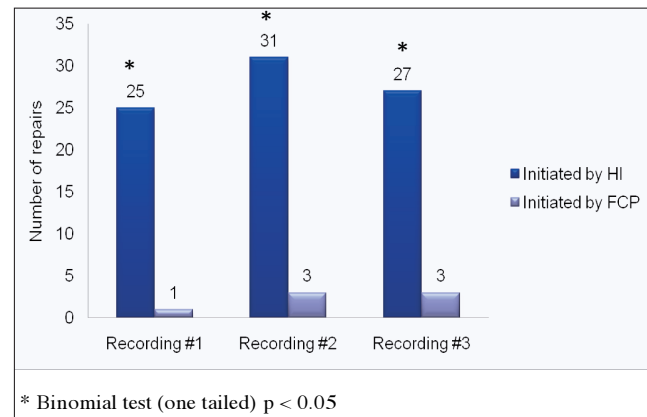


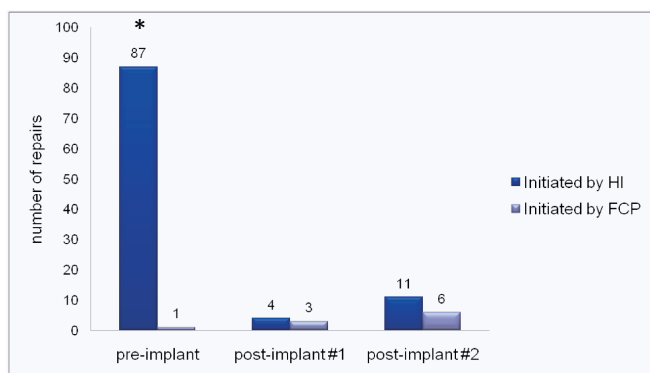
Figure 3. Numbers of OISR sequences by speaker of the repair initiator across three recordings, each three months apart and in the absence of intervention.

Research Question 3. Changes in Repair Behaviour Following Intervention

The same process outlined above was undertaken with the second dyad, with the single variation that only one recording was taken prior to implantation while recordings two and three were taken some months following implantation. This case study aimed to address the question:

Does Cochlear Implantation Alter the Occurrence of Repair in Conversations Involving an HI Individual and his/her FCP, and if so, How do the Patterns of Repair Alter?

The results for this case study are presented in Figure 4. The data indicate a similar asymmetry in initiation of OISR sequences in the conversation recorded prior to implantation and a very substantial change in the number of repairs initiated by the HI adult for both recordings following implantation. It is also interesting to note that the OISR sequences initiated by the HI adult fall to numbers similar to those of the FCP. Statistical analysis indicated a significant change in proportions of OISRs attributed to the HI adult before and after implantation. Analysis also indicated no change in proportions of OISRs initiated by the HI over the two occasions following implantation.



* Binomial test (one tailed) $p < 0.05$

Figure 4. Numbers of OISR sequences by speaker of the repair initiator across three recordings, the first prior to cochlear implantation and the second and third following implantation.

These results suggest that conversation repair behaviour may be sensitive to the effects of intervention. In conjunction with the results from research question 2, it may be suggested that repair demonstrates both consistency over time (in the absence of intervention) and sensitivity to intervention that make it a good candidate for the assessment of the effects of intervention in aural rehabilitation.

Research Question 4. Do Repair Sequences in Continuous Discourse Tracking Mimic the Sequential Elements of Repair in Conversation?

A number of conversationally oriented tasks have been developed to address the communicative behaviours influenced by post-lingual hearing impairment, including repair. These tasks attempt to provide hearing impaired adults with realistic and relevant clinical experiences so that the measures and skills acquired during clinic are readily generalizable to everyday conversation. However, little disciplined investigation has been undertaken to evaluate the ecological validity or the effectiveness of these procedures, when applied to the evaluation and training of repair behaviour.

Therefore the third study took the preliminary step towards evaluating the conversational qualities of repairs arising during a widely used aural rehabilitation task, continuous discourse tracking (tracking). Both qualitative and quantitative analysis of the sequential patterns of repair behaviour in tracking and conversation was undertaken to address the following research question:

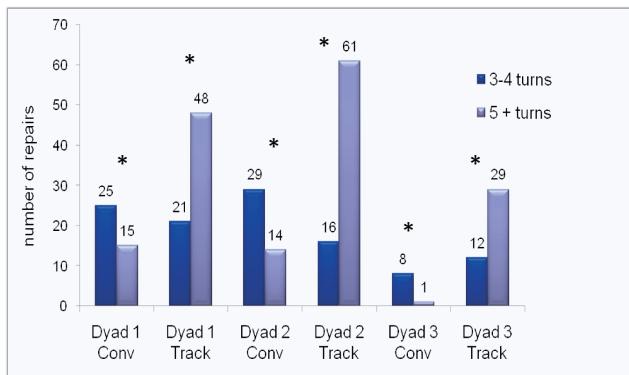
Do Repair Sequences in Continuous Discourse Tracking Mirror those Occurring in Conversations Between Adults with Acquired Hearing Impairment and Their Familiar Communication Partners and if so How?

Tracking has long been considered one of the most conversation-like assessment and intervention tasks as it involves the use of connected text as stimulus material and allows for turn-taking between participants. The task involves a sender and a receiver (usually the hearing impaired adult). The sender reads aloud from a predetermined text in grammatical segments of up to 6 or 7 words, which the receiver is required to repeat with 100% accuracy. Following the presentation of a text segment there are three possible response outcomes: (a) the receiver provides a 100% accurate repetition and the sender moves on to the next segment of text, (b) the receiver's faithful attempt at repetition is incorrect and the sender initiates a repair sequence in the following turn (sender-initiated repair), or (c) the receiver recognises they have not perceived the spoken text sufficiently to allow repetition of the text with 100% accuracy and consequently requests clarification regarding the content of the spoken text, thus instigating a repair sequence (receiver-initiated repair).

At the outset of this research, it was hypothesised that sender- and receiver-initiated repairs in tracking would be analogous to the types of repair that have been shown to be vulnerable to the effects of post-lingual hearing impairment, namely 3rd PR and OISR sequences respectively. Qualitative analysis of the data, however, failed to reveal a distinction between sender- and receiver-initiated repairs. Whilst 13 types of repair were identified in tracking, the requirement for the sender to present predetermined text segments to which the receiver is required to respond with repetition, limited the sequential turn options available to participants. The TS always comprised the predetermined text segment, the receiver's response usually comprised an attempt at repetition and the sender's repair turns were also usually limited to a repetition of the text segment. As a consequence, there were no lexical-syntactic (or prosodic) markers that served to reliably distinguish receiver responses that comprised "faithful repetitions" from "requests for clarification", and thus by which to distinguish sender- and receiver-initiated repairs. Furthermore, the receiver's response, in the context of a repair sequence, always served as a RI by virtue of it always being incorrect and/or only a partial attempt at

repetition (and was recognised by the sender as demonstrating that the spoken text had not been perceived correctly/entirely). The traditional distinctions drawn between 3rd PR and OISR sequences (outlined previously) therefore, do not apply to repair sequences in tracking, with all repairs being similar (but not analogous) to OISR sequences in conversation.

Quantitative analysis of the data also revealed no significant relationship between the number of turns taken for repairs to reach resolution in conversation and tracking for each dyad (see Figure 5). In the conversation of each dyad, the majority of repairs initiated by the hearing impaired adult were completed in 3-4 turns or one RI/R sequence (the minimum number of turns required to resolve repairs), whilst the majority of repairs in tracking tended to be longer, requiring 5 or more turns (more than one RI/R sequence) to reach resolution. Therefore the length of repair sequences in tracking was not reflective of the efficiency with which repair sequences were resolved in conversation.



Proportions test – significant at $p < 0.05$ for each dyad

Figure 5. Comparison of the number of turns taken to resolve OISR sequences in conversation and in tracking.

Overall, the results of this study did not support the hypothesis that sender- and receiver-initiated repairs in tracking mirror 3rd PR and OISR sequences in conversation. Whilst repairs in tracking were found to be structurally similar to OISR sequences in conversation, the conversational qualities of these repairs were limited by the response requirements and the criterion of 100% accuracy. Conversation is fundamentally sequential with participants constructing their turns in response to the prior turns of others. Little/no constraints are imposed on the nature of participant turns and as such can take

on an infinite number of sequential forms. The tracking task allows some opportunity for sequential behaviour, in that both participants are required to structure their turns in response to the prior turns of the other participant. However, participants have restricted sequential turn options, with their turns usually being limited to some form of repetition because that is the requirement of the task. Furthermore, the requirement for the receiver to respond with repetition does not allow for the development of indirect or implied meaning that is inherent in everyday conversation.

The findings of this study therefore suggest that tracking’s conversational orientation is in its use of connected text rather than isolated sentences, its focus on turn taking and the targeted resolution of repair. The requirement for repetition and 100% accuracy however, serves to limit the content and sequentiality of participants’ turns to the extent that the interaction (and the structure of repairs) bears little resemblance to that occurring in everyday conversation. As such, the ecological validity of tracking, as a conversationally-oriented task, may be somewhat limited when applied to the evaluation and training of repair. Conversation-based tasks in which little or no restrictions are imposed on participant response may allow for more conversation-like repair sequences to arise.

Summary and conclusions

The research presented here provides early evidence for the clinical utility of patterns of conversation repair behaviour as measures of clinical intervention for rehabilitative devices and services. It is important to note that the small numbers in these studies and the intensive nature of the analysis prevent the direct translation of these results to broader research or clinical contexts. It remains for these findings to be verified and extended across larger samples prior to claims of the provision of an evidence base for practice in conversationally-orientated aural rehabilitation. Similarly, while tracking has been prominent amongst the clinical tools in aural rehabilitation, it has been shown here to have some limited application to patterns of everyday conversation. It remains the only assessment/intervention technique to have been subjected to this analysis.

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