GROUNDING UTTERANCES USING LOW-TECH VISUAL SCENES SYSTEMS VS. TRADITIONAL AAC

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Background

Visual scene displays (VSDs) are an AAC user interface designed to provide a pictoral representation of a complex event occurring in its natural context (McKelvey, Dietz, Hux, Weissling, & Beukelman, 2007). The amount of information that is made available to both conversation partners is thought to be the key factor in changes in communication performance on the part of the individual with severe aphasia. It has been suggested that VSDs have impacted the ability of individuals with severe aphasia to share stories about their past experiences for social communication as opposed to just fulfilling wants and needs as with traditional AAC.

Preliminary research with VSDs revealed that individuals with severe aphasia
1. prefer personal-contextual photographs to icons or drawings
2. show improvements in efficiency, accuracy, utterance length, and well as the number of turns during interactions mediated by VSDs are improved

Documentation of what is occurring within the interactions themselves has not been specifically addressed. Conversation as a joint performance, rather than just as a function of using language in a grammatical way is important for understanding changes in the quality and content of communication interactions, thus helping us understand what it is about VSDs that make these differences in the quality of talk within an interaction.

Research Questions

1. Do PWAs introduce topics differently using VSD systems versus typical communication methods (TCMs) while engaged in a narrative telling activity with a familiar conversation partner (FCP) ?
   1a) Are there differences in the amount of time it takes dyads to establish the selected topic of conversation when using VSDs versus TCMs?

2. Are there differences between VSDs versus TCMs (aided or unaided) in terms of presentation types during the topic establishment phase of an interaction?
   2a) What proportion of time do dyads engage in on-topic talk versus other types of talk when using VSDs versus TCMs?
   2b) Do the dyads engage in more or less communication repair when using VSDs versus TCMs

3. What percentage of time is spent in joint attention across 7 focus areas when using VSDs versus TCMs?
   3a) What proportion of joint attention time is spent actively communicating?
   3b) What proportion of active communication are dyads engaging in on-topic talk versus other types of talk when utilizing VSDs versus TCMs?

Methods- Participants

Participants

- 3 individuals with moderate-to-severe aphasia
- 3 informants
- 3 familiar conversation partners

Characteristics of PWAs

Participant	Age	Time Post-onset	Marital Status	Informant	Communication mode*	Pre-stroke occupation
CJ	72	10 yrs 2 months	Married	Spouse	G, V, SGD	Parts inspector
HB	75	2 yrs 4 months	Married	Spouse	G, V, LTD	Registered Nurse
NL	57	4 yrs 7 months	Single	Son	G, V, DR, WR, RS, LTD	Statement processor for a bank

* G=gestures, V=verbalizations, DR=drawing, WR=writing, RS= residual speech, LTD= low-tech device, SGD=speech generating device

Aphasia Quotient scores from the *Western Aphasia Battery*

Participant	Spontaneous Speech	Comprehension	Repetition	Naming	Aphasia Quotient	Aphasia Type
CJ	0	2.2	0.6	0	5.6	Global
HB	0	3.2	0.7	0	7.8	Global
NL	0	3.1	1.6	3.6	16.5	Global

Methods- Protocol

1. A visual scene low-tech communication book was built for each individual with aphasia using photographs identified and collected from the participant's private photograph collection.
2. There were three phases for the process of building the VSD system: informant phase, development phase, and validation phase.
3. PWAs and their caregivers/spouse selected personally relevant photographs for six themes.
4. The selected photographs were sorted and the VSD communication book was constructed according to the VSD protocol available through then Nebraska AAC website.
5. PWAs and their caregiver/spouse reviewed the book and any necessary adjustments were made.

Experimental task protocol
- 2 training sessions
- 2 experimental sessions with random assignment of counterbalanced order within sessions across participants
    1. Narrative telling interaction in VSD condition
    2. Narrative telling interaction in TCM condition

Agreement
A point by point agreement method was used where agreement was 98% for both transcription and coding.

Data Collection and Analysis

Data was collected from both experimental sessions and included the entire interaction for both conditions. The topic establishment phase of these interactions were analyzed because the length and content of this portion of the interaction is a good indicator of the relative effectiveness of the VSD (Garrett & Huth, 2002).

Quantitative Data
- Experimental sessions videotaped
- Topic establishment phase analyzed

Data coded for
- Verbal signals: utterances (speech/vocalizations, device output for communication)
- Nonverbal signals: gestures (limb, head, gaze direction), device use, gaze
- Contribution presentation types

Duration of topic establishment phase
- Topic establishment phase identifiable and can be precisely measured.
- Topic pre-determined by PWA and the experimenter.
- The topic establishment phase was defined as beginning with the talk that takes place before the acceptance of a topic, where one conversation partner attempts to introduce a topic, and ends at the time in which the acceptance of that topic occurs.

Presentation type utilization during introduction of topics using VSD displays versus TCM
1. Main- contributions that provide propositional information directly related to the current topic or task or on-talk behavior, which is clearly the most direct method for introducing a topic.
2. Side/Off task- talk directed toward a 3rd party (not the current addressee); self directed talk not intended to be responded to by the addressee; or a joke or short stretch of conversation unrelated to the current topic or task.
3. Repair- the presentation is focused on identifying, locating, and/or resolving a current communication problem (attention, mishearing, or misunderstanding), or repairing one's own communication through repetition or rephrasal.
4. Collateral- includes those things that do not offer new information to common ground but help to accept a contribution and supports common ground.
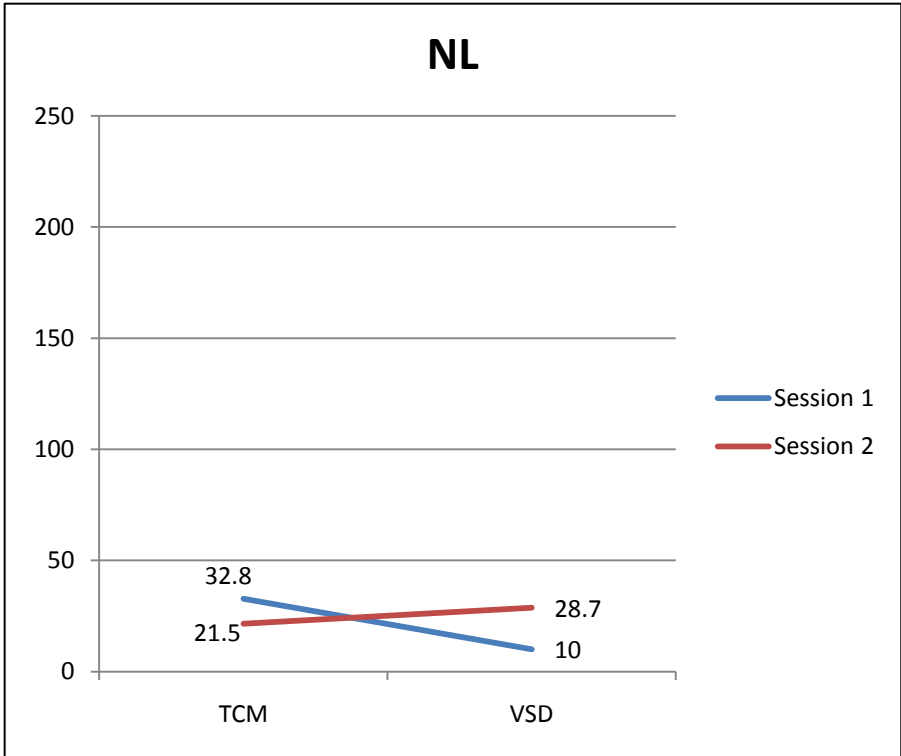
Independent variables
1. Group membership: PWA or communication partner
2. Session: experimental session 1 versus 2
3. Communication method: VSD or TCM

Dependent variables
1. Duration of topic establishment
2. Relative frequency and duration of presentation type
3. Duration of time spent in joint attention
4. Duration of time spent in active communication during joint attention
5. Proportion of time spent in presentation types during joint attention and active communication

Results

Duration of Topic Establishment in TCM & VSD (in seconds):

CJ chart — Session 1 (blue): TCM 183, VSD 46; Session 2 (red): TCM 89, VSD 30

HB chart — Session 1 (blue): TCM 240, VSD 32.5; Session 2 (red): TCM 61, VSD 17

NL chart — Session 1 (blue): TCM 32.8, VSD 10; Session 2 (red): TCM 21.5, VSD 28.7
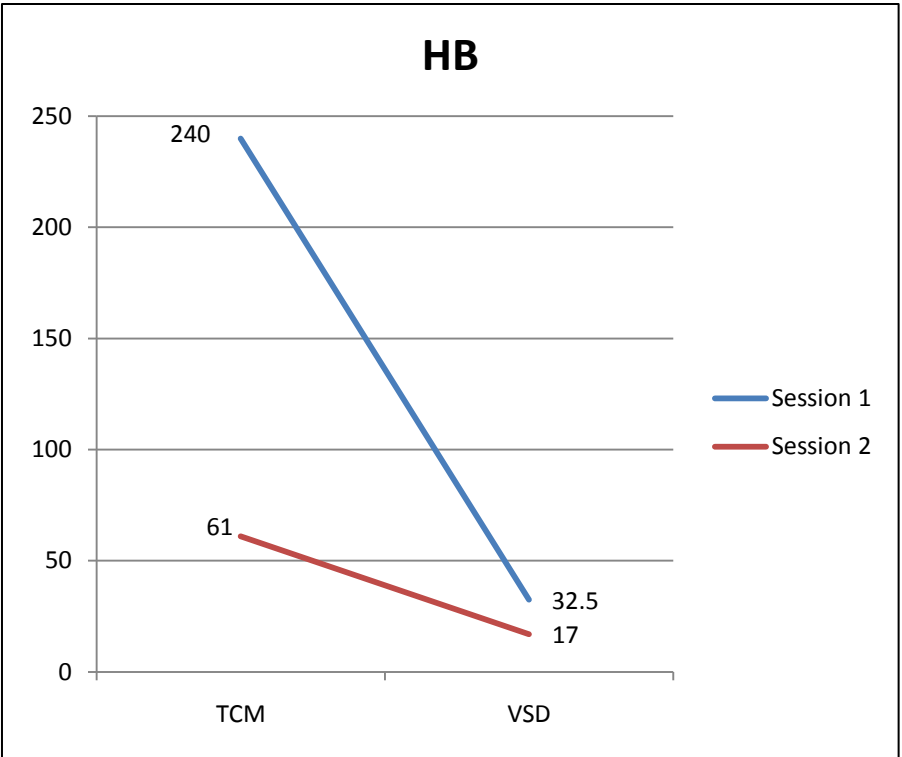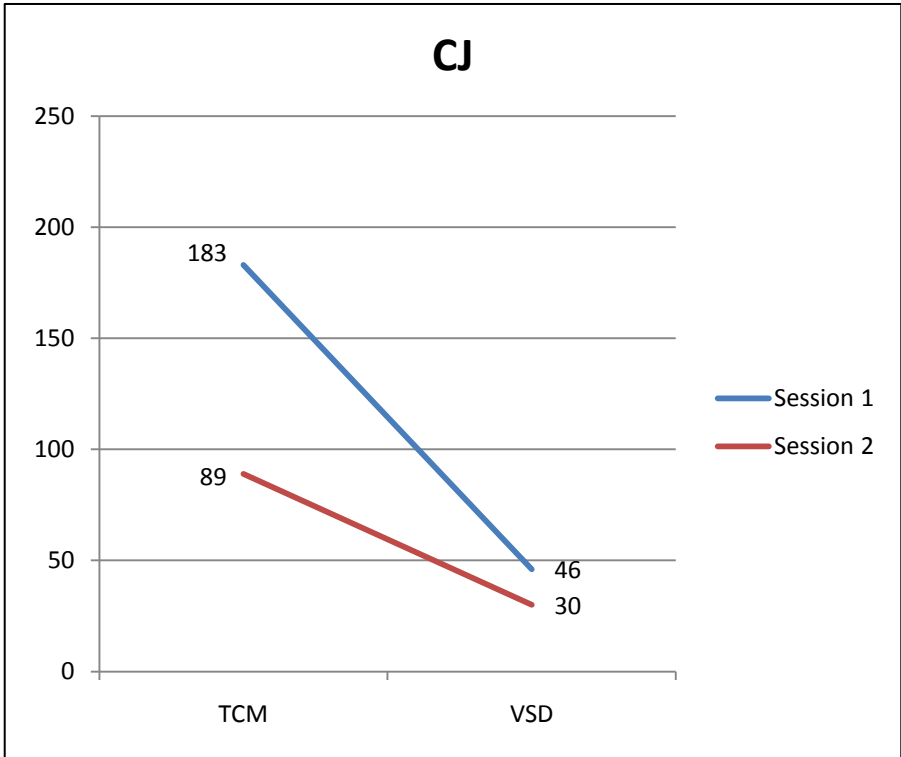
- Relationship between VSD topic setter and the time it took establish the topic

- 2 of 3 participants performed similarly

- Decrease in duration of topic establishment ranged from a .66 proportional decrease with CJ to .87 proportional decrease with HB

- In contrast to the other participants, NL's performance did not indicate a decrease in topic establishment time: Possible floor effect

Duration of presentation type by session & condition:

Similar durations of main line talk was found for all conditions in all sessions, the notable differences are found in looking at the other types of talk in which these participants engaged.
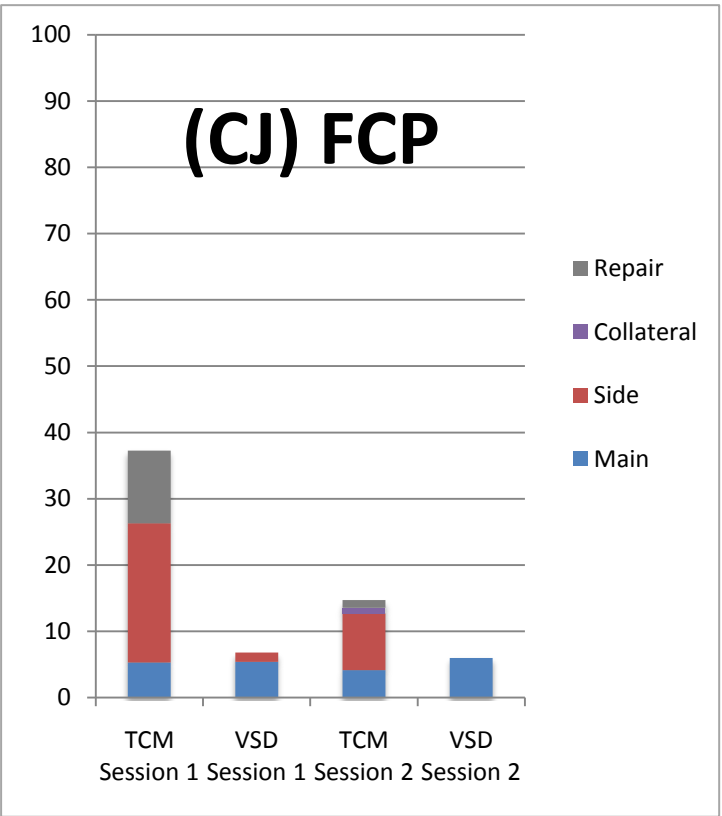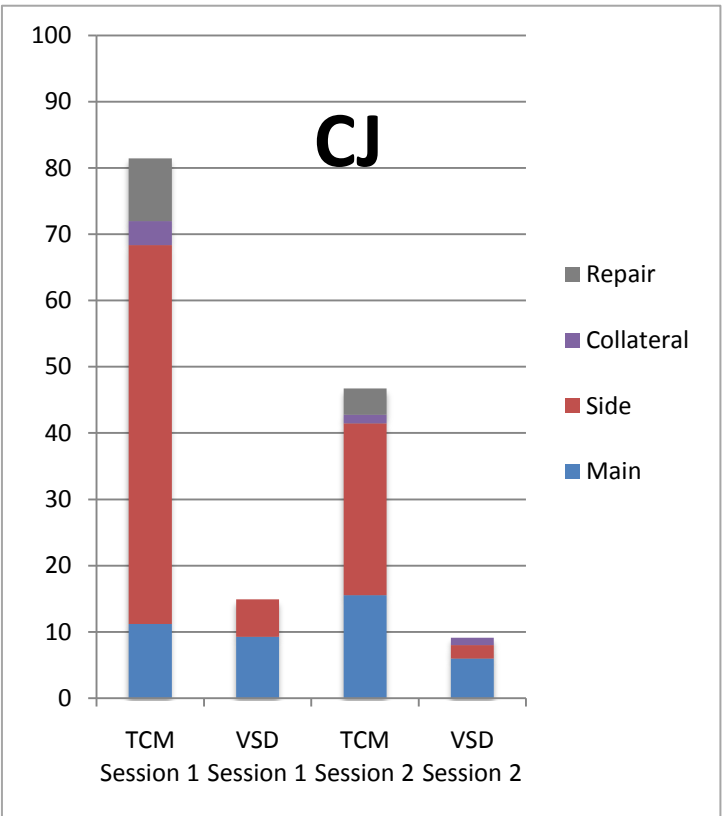

CJ & (CJ) FCP
- Regardless of session number, for CJ and (CJ) FCP, the focus of talk was more consistently on establishing the target-topic or in "main-line talk" in both VSD interactions
- No time was spent on repairing contributions in either VSD interaction
- While the duration of TCM main-line talk looks similar to the VSD conditions, a greater amount of time was spent in side talk and in repair in the TCM condition
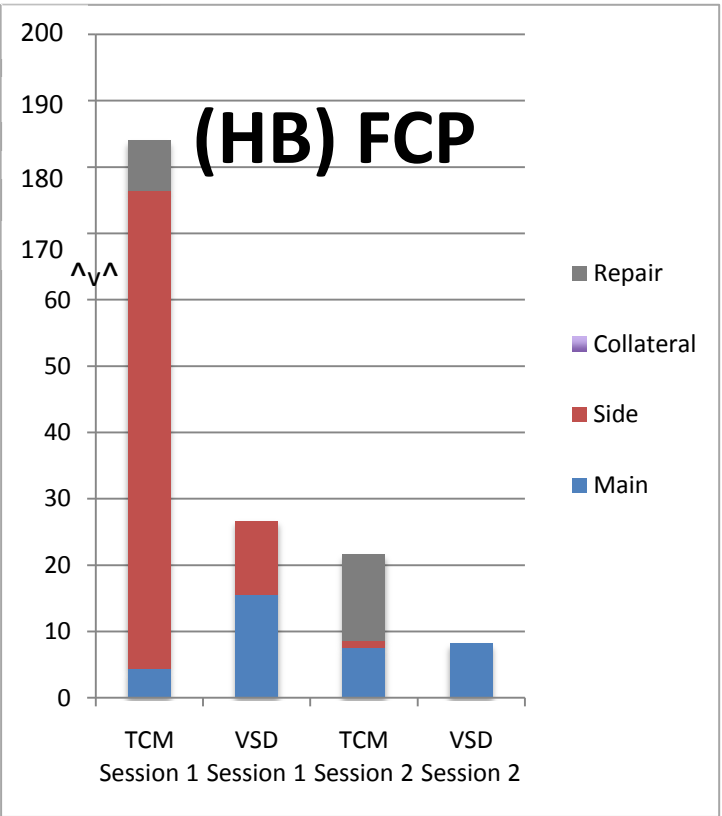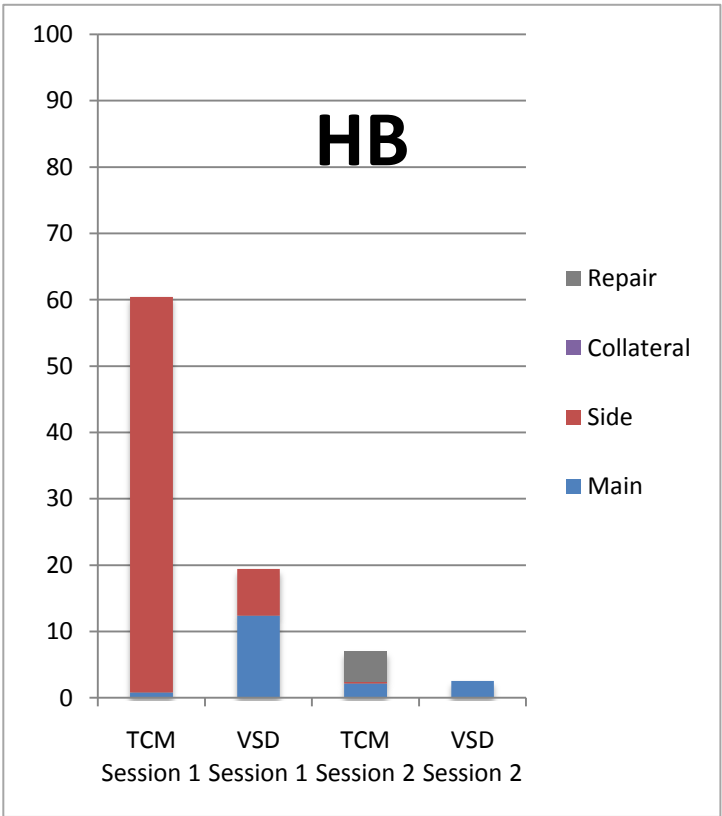
HB & (HB) FCP
- Proportionally a greater amount of time spent in main-line talk for both VSD sessions with proportionally little time engaged in side talk in the first VSD interaction and no side talk in the 2nd VSD interactions
- TCM dominated by side talk as well as time spent in repair, with HB spending an average of 65% of her time in repair in the TCM interactions and (HB) FCP spent an average of 33% in repair in the TCM interactions
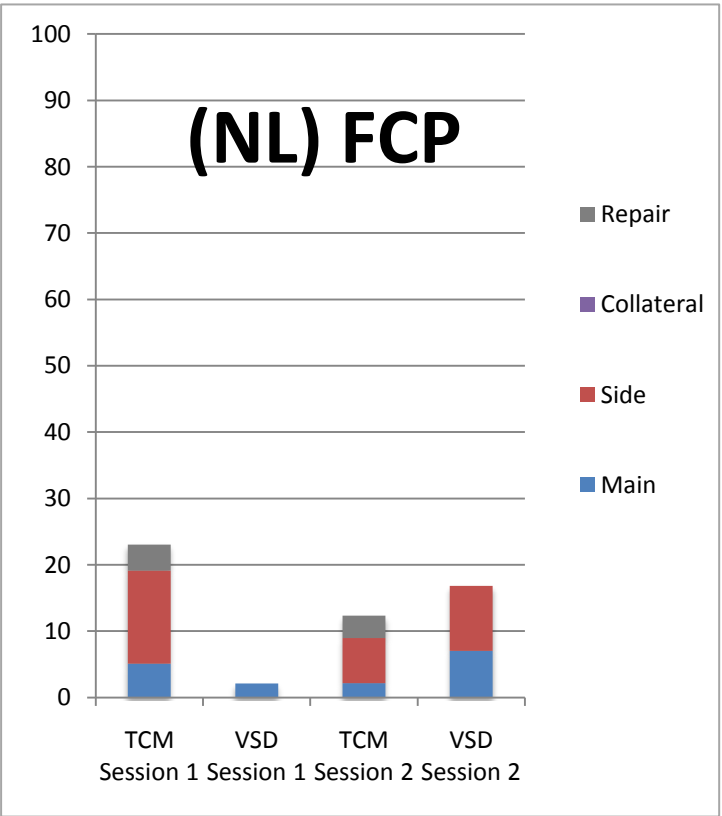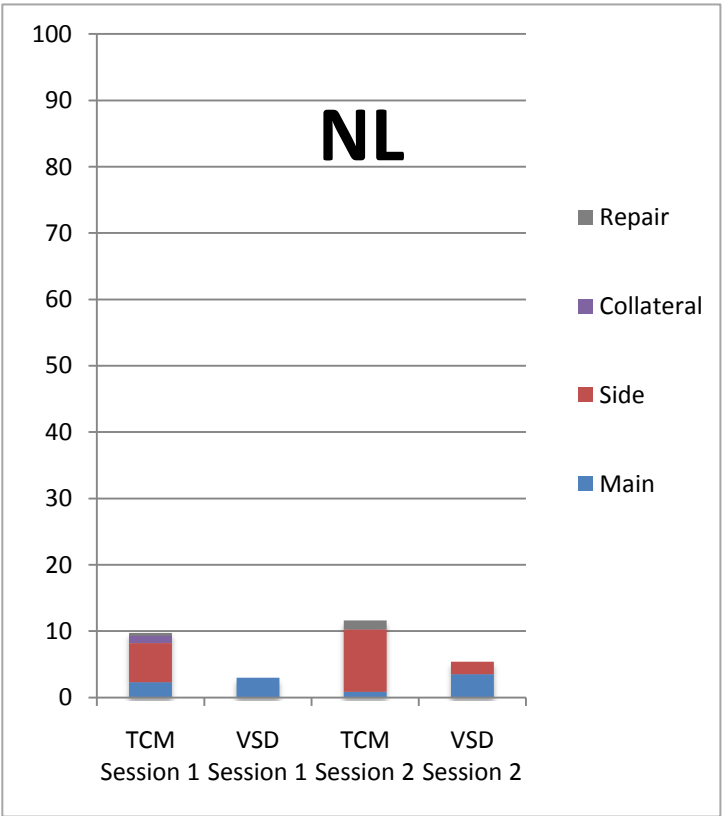
NL & (NL) FCP
- NL performed similarly to CJ and HB in that the type of talk was proportionally more focused in main –line talk
- TCM dominated by side talk
- For (NL) FCP, there is proportionally more side talk that main line talk
- While NL utilized the VSD to stay on topic or to focus on main-line talk, (NL) FCP added to the time it took the dyad to establish the target topic

Results

Percentage of time spent in joint attention and active communication by presentation type
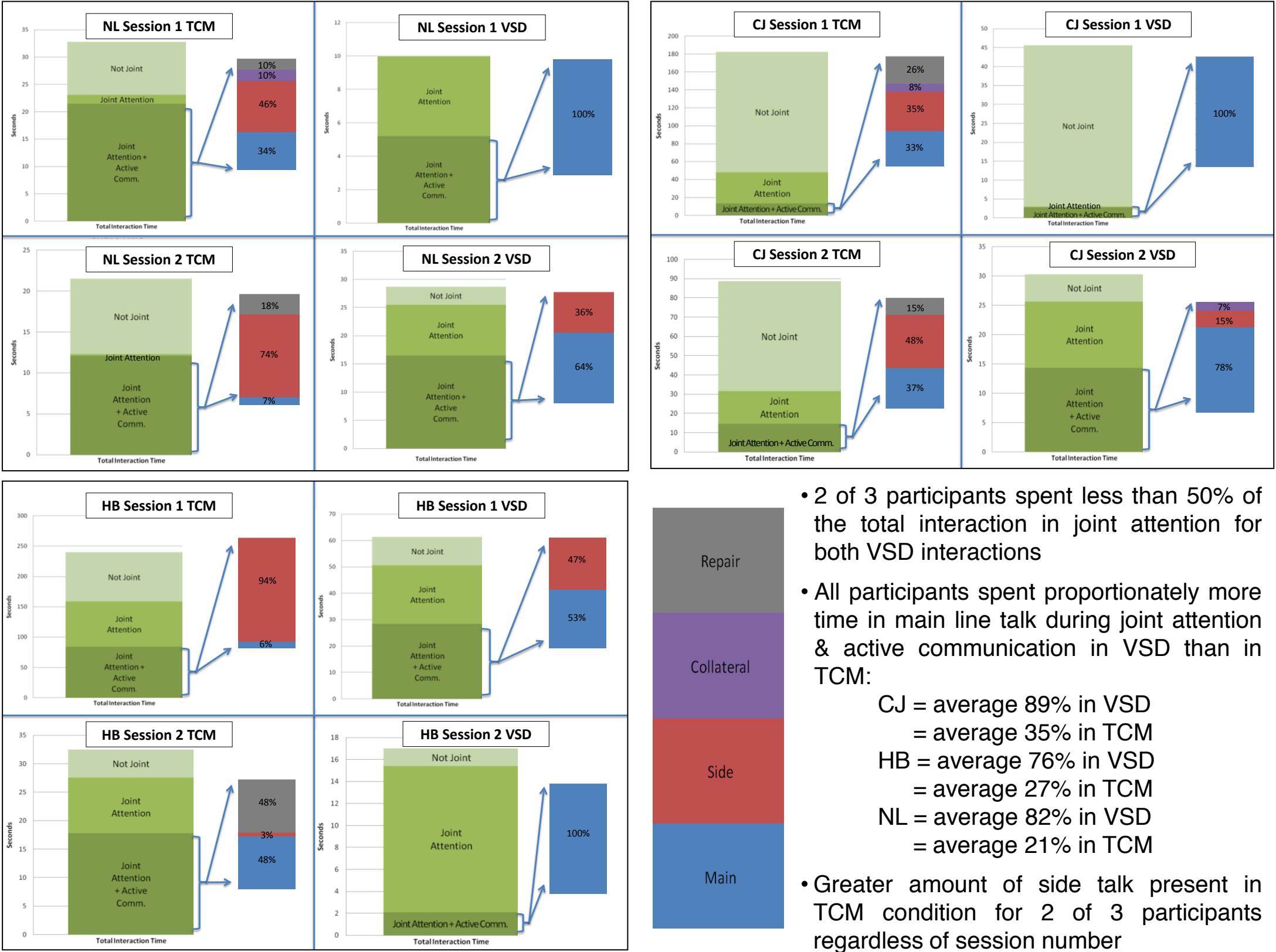
- 2 of 3 participants spent less than 50% of the total interaction in joint attention for both VSD interactions

- All participants spent proportionately more time in main line talk during joint attention & active communication in VSD than in TCM:
  - CJ = average 89% in VSD
     = average 35% in TCM
  - HB = average 76% in VSD
     = average 27% in TCM
  - NL = average 82% in VSD
     = average 21% in TCM

- Greater amount of side talk present in TCM condition for 2 of 3 participants regardless of session number

Discussion

- Topic establishment shorter in duration for 2 of the 3 participants regardless of session number
- Greater proportion of main line talk for all users in VSD condition
- TCM condition dominated by off task talk
- Repair present in all TCM conditions for all participants but not present in the VSD condition
- VSD was an effective topic setter with an increase in joint attention
- Main line presentation types dominated all VSD interactions while participants were engaged in joint attention during active communication

Limitations of Study
1. Small sample size
2. Descriptive statistical analysis only
3. Limited ability to generalize results
4. Personal and contextual photograph pool limited

Future Work
1. Begin to investigate: use of gestures across conditions & participant roles during interactions
2. More detail within the composition of the grounded contributions & strategies used to ground utterances
3. Analyze communication activities beyond the topic establishment phase
4. Continue to recruit participants

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Acknowledgments

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