# Exploring the Role of Narrative in the Assessment, Diagnosis and Treatment of Aphasia

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# Narrative ….. and beyond!

# Acknowledgements

Dr Anne Whitworth – Curtin University, Australia

Dr Julie Morris – Newcastle University, UK

# The Plan

## In the beginning….

- Background – sentence, narrative and discourse production
- Analysing narrative – role within assessment and diagnosis of sentence production difficulties
- Analysing discourse – multi-level analysis

## In the middle….

- What we know about language based intervention for word retrieval and sentence production
- Multi-level therapies: The NARNIA study

## In the end….


- Measuring outcome

# Introduction to Spoken Production in Aphasia

- Historically dichotomy between **agrammatism** and **paragrammatism**

- **Agrammatism**
  - Typical of Broca's aphasia
  - Non-fluent – reduced rate of speech/impaired prosody
  - Short phrasal length
  - Reliance on single nouns
  - Difficulty with verbs
  - Omission of function words (determiners, pronouns, auxiliary verbs and some prepositions)
  - Auditory comprehension and object naming skills relatively spared


‘cookie jar . . . fall over ….. chair . . water . . . empty . . . ov . . ove …’ (Examiner: overflow?) ‘yeah’

# Introduction to Spoken Production in Aphasia

- Historically dichotomy between **agrammatism** and **paragrammatism**

- **Paragrammatism**
  - Typical of Wernicke's aphasia
  - Fluent output (often copious amounts and at a higher rate)
  - Normal phrase length
  - Many function words and affixes but often misused/substitution errors
  - Presence of paraphasias (neologisms, semantic and phonological errors)
  - Impaired naming and auditory comprehension


‘well this is . . . mother is away here working her work out o’ here to get her better when she’s looking, the two boys looking in the other part. One their small tile into her time here. She’s working another time because she’s getting too. So the two boys work together an’ one is sneakin’ around here making his work and his further funnas his time he had. He an’ the other fell were running around the work here will mother another time she was doing without everything wrong here.’

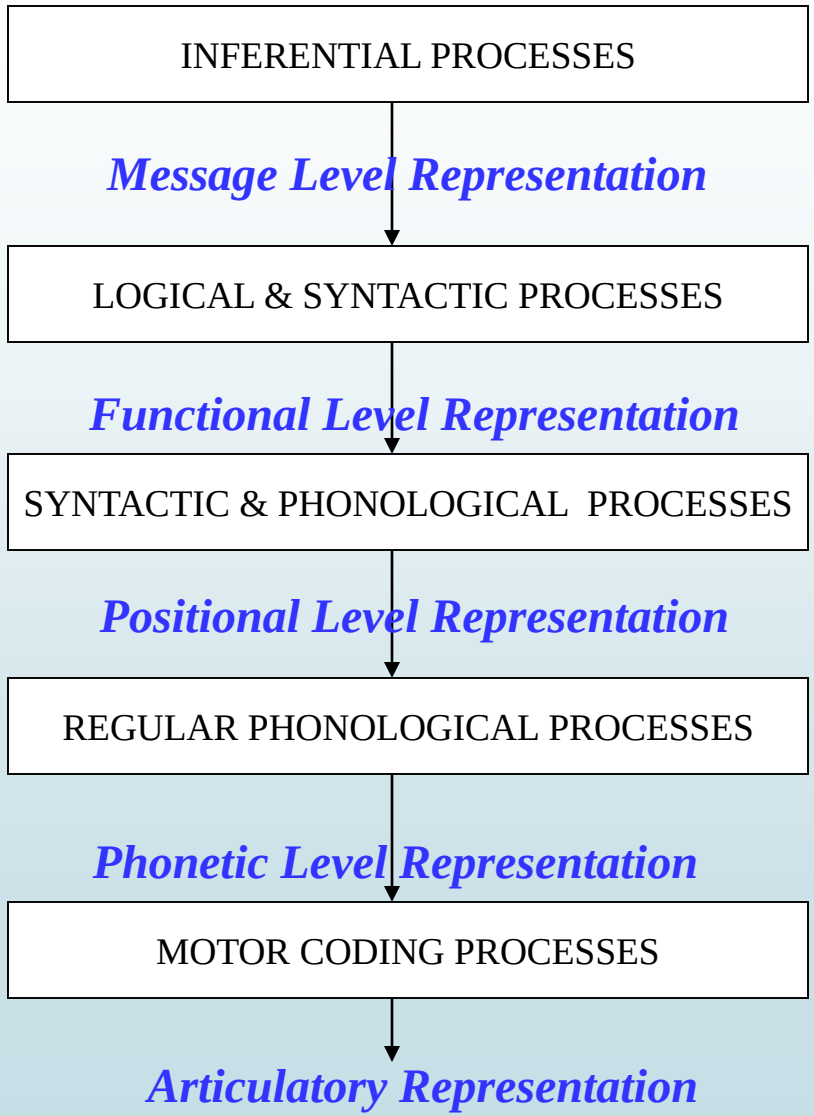
# Introduction to Spoken Production in Aphasia

Sentence production difficulties – more diverse

- Overlap between features of agrammatic and paragrammatic speakers
- Extensive variability between individual speakers
- Dissociations between features
- Unlikely to be a single underlying impairment
- Labels give limited insight to the features present in an individual speaker

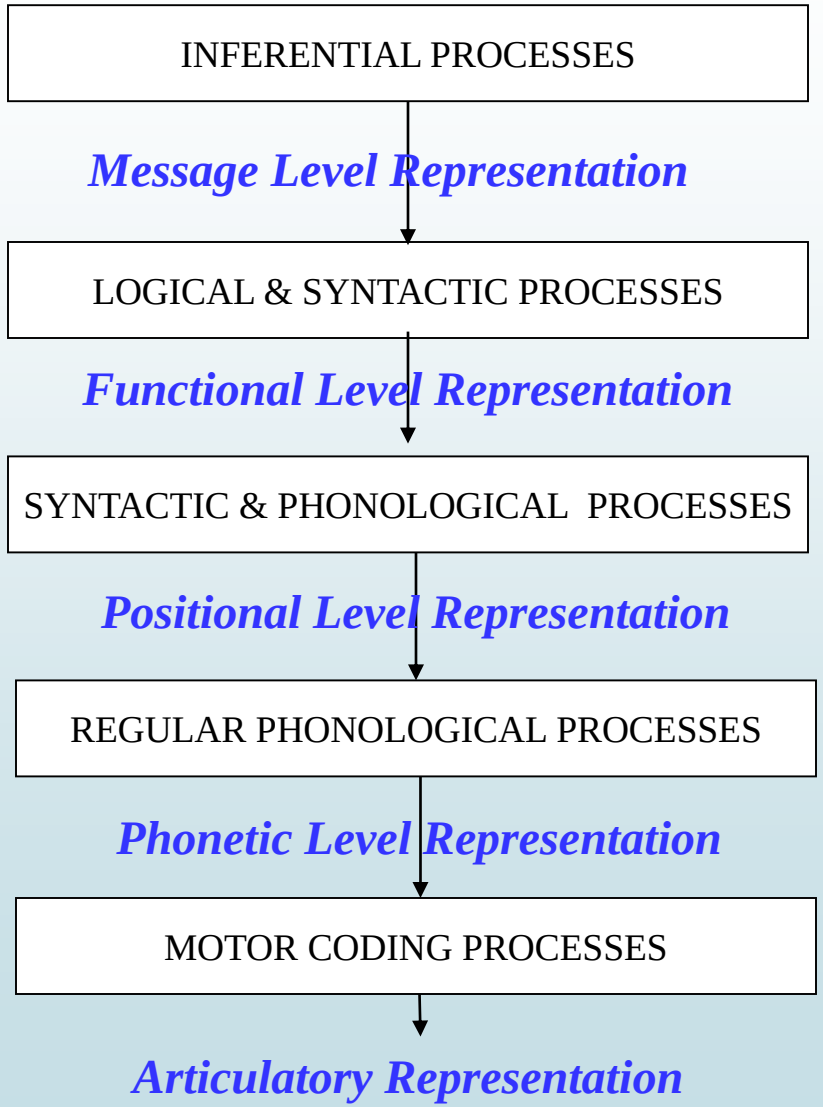
Some researchers moved to considering the sentence production of people with aphasia in relation to model of normal sentence production (e.g. Garrett, 1980, 1988)

# Garrett's Model of Sentence Production




Taken from
Schwartz (1987)

# Garrett's Model of Sentence Production

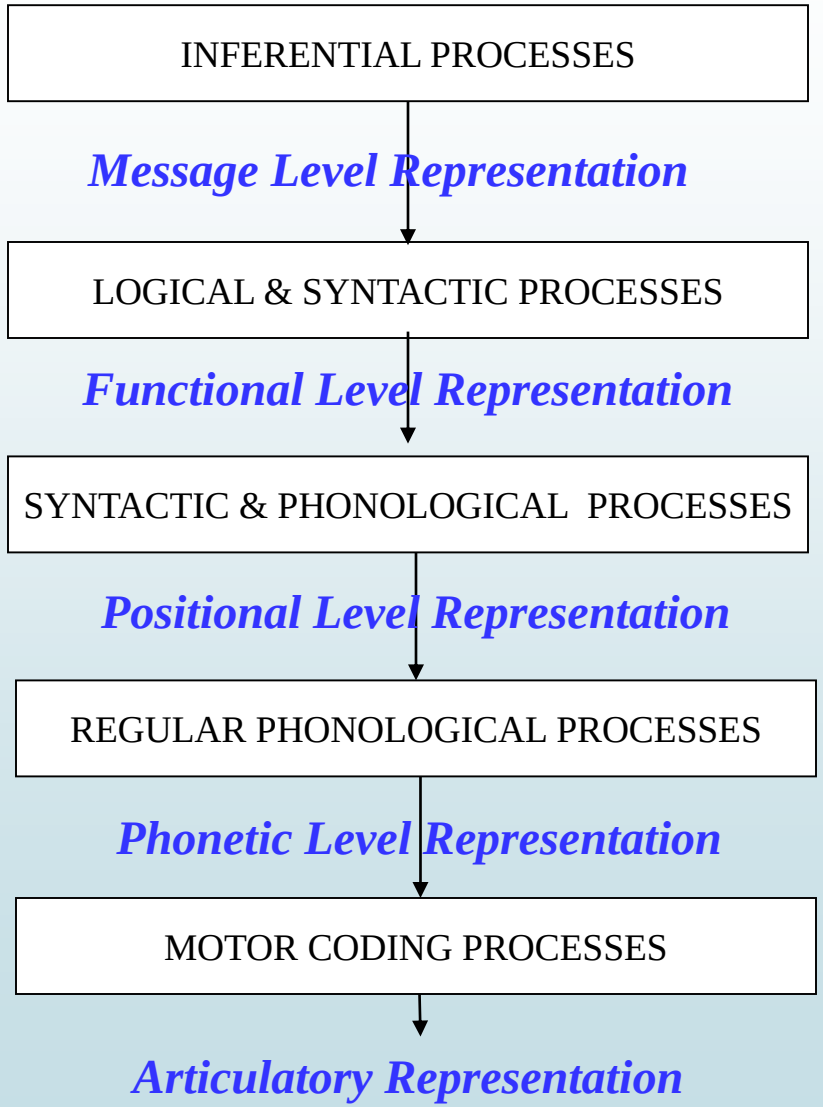



Non-linguistic, conceptual information

Abstract semantic representation – verb and its arguments

Phonological representation – syntactic and phrasal structure

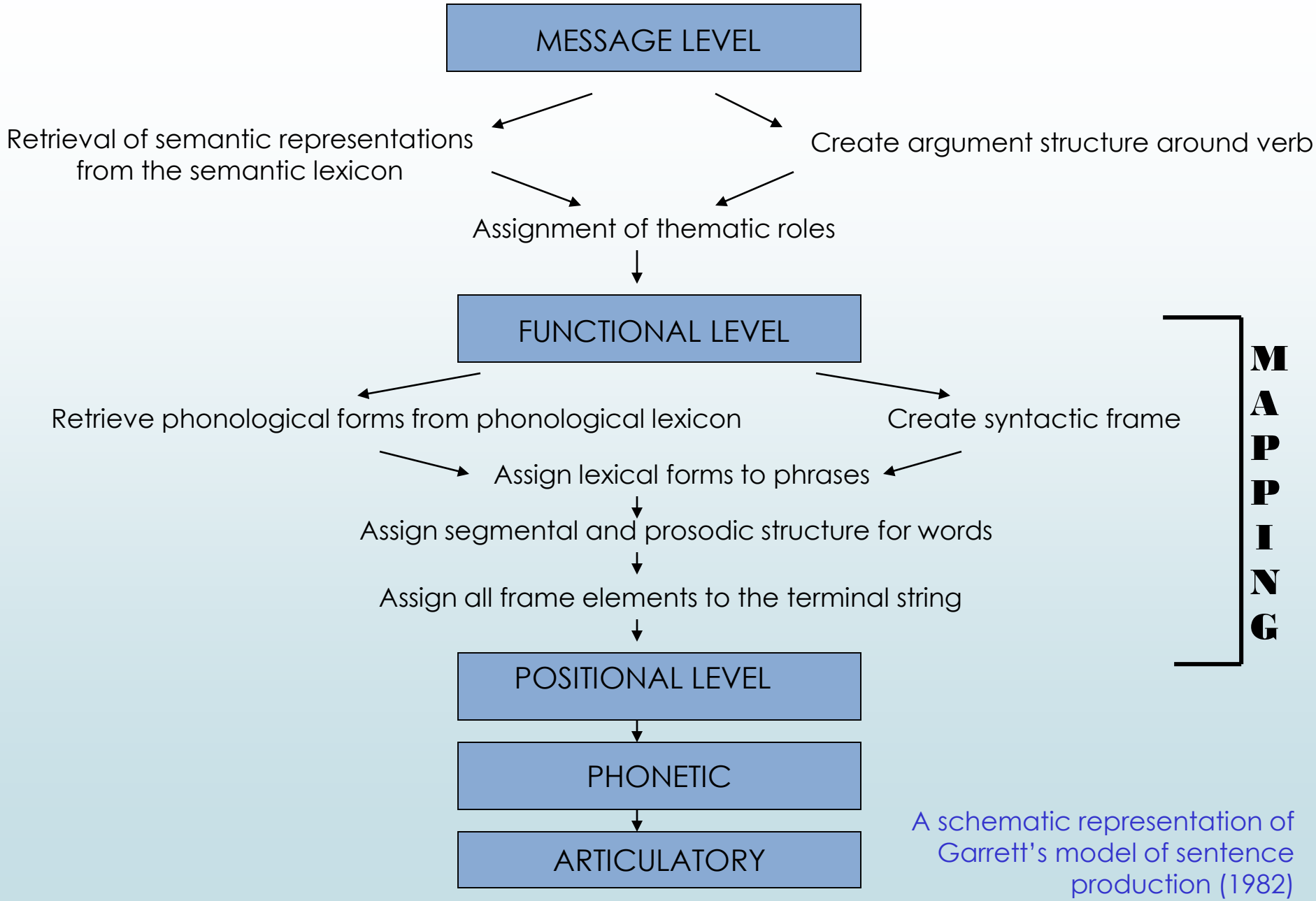
# Garrett's Model of Sentence Production




Event-level processing difficulties

Semantic-level (thematic) sentence processing difficulties

Syntactic-level sentence processing difficulties




A schematic representation of Garrett's model of sentence production (1982)

# Introduction to Discourse Production in Aphasia

- Discourse (Armstrong, 2000)
  - Structuralist -unit of language above the sentence
  - Functionalist - language in use
- Meaning of discourse – not a 'sum' of the individual words and sentences
- Cohesion – 'interpretation of some element in the discourse is dependent on that of another' (Armstrong, 2000)
  - Grammatical cohesive devices e.g. conjunctions, pronouns, demonstratives
  - Lexical cohesive devices
- Coherence –quality of discourse 'its unity, connectedness' (Linnik et al. 2015)

# Introduction to Discourse Production in Aphasia

- Discourse genres – 'different ways of using language to achieve culturally established tasks' (Eggins & Martin, 1997)
  - Narrative
  - Recounts
  - Procedural
  - Exposition

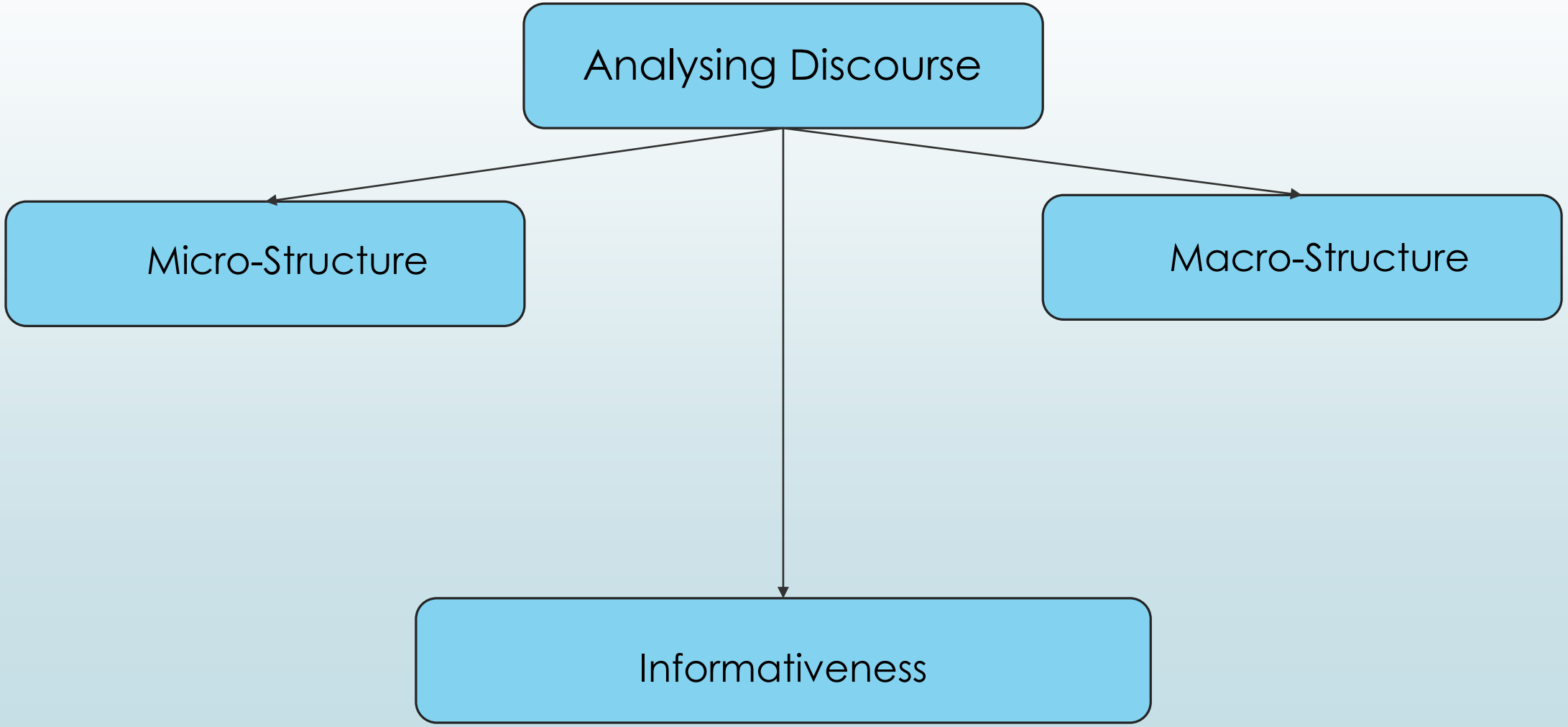
- Within the conversational exchange of questions and comments, participants may tell their partners about events (narrative discourse), provide directions or instructions (procedural discourse), describe something in detail (descriptive discourse), or explain something in depth (expository discourse)…In real-life discourse speakers are free to switch between discourse types …" (Boyle, 2011, p 1310).

# Analysing Discourse: Elicitation Paradigms

| Connected Speech | | |
|---|---|---|
| **Picture Description** | **Discourse** | |
| | **Monologues** | **Dialogues** |
| • Complex picture description<br>• Picture sequences | • Narrative, e.g. story retell<br>• Personal narrative, e.g. recount<br>• Procedural narrative<br>• Expositions, e.g. opinions | • Conversation (more or less naturalistic sampling)<br>• Role play |

See Webster, J., Whitworth, A, & Morris, J. (2015) Is it time to stop 'fishing'? A review of generalisation following aphasia intervention. Aphasiology, 29, (11),1240-1264 .

# Analysing Discourse: Focus of Analysis



# Analysing narrative …..focusing on microstructure

# Analysing Narrative: Micro-structure

Some examples:

- Quantitative Production Analysis (QPA) (Saffran, Berndt & Schwartz, 1989, Rochon et al. 2000)
- Analysis of lexical characteristics of words within narrative (Bird & Franklin, 1996)
- Analysis of verbs and argument structure (Thompson et al. 1995)
- Analysis of syntactic realisation of PAS (Byng & Black, 1989)
- Analysis of thematic and phrasal structure (Webster et al. 2007)

See Summary Table in Handout (Taken from Webster et al. 2009)

# Study of Narrative Production

**Aims**

- Profile thematic, phrasal and morphological structure of sentences
- Compare production of people with aphasia and normal control participants
- Compare patterns seen in people with fluent and non-fluent aphasia

**Participants**

- 20 normal control participants, 4 men & 16 women, mean age 54.9 years (range 19-90)
- 22 people with aphasia, 10 men and 12 women, mean age 60.6 years (range 40-80). People had aphasia as a consequence of single CVA and presented with sentence production difficulties. 16 non-fluent and 6 fluent speakers.

See: Webster, J., Franklin, S., & Howard, D. (2007). An analysis of thematic and phrasal structure in people with aphasia: What more can we learn from the story of Cinderella? *Journal of Neurolinguistics, 20, 363-394.*

# Study of Narrative Production

**Method**

- Cinderella narrative
- Narrative produced and transcribed as in Saffran et al. (1989)
- Rate of speech calculated
- Narrative core extracted as in Saffran et al. (1989) except:
  - Whole sample used (as in Bird & Franklin, 1996)
  - Direct speech not excluded
- Analysis of thematic structure (functional level representation), phrasal structure (positional level representation) and morphological structure (positional level representation)

# Study of Narrative Production

**Analysis**

- Comparison of normal control participants and people with aphasia
- Comparison of non-fluent and fluent speakers with aphasia
- Investigation of performance of individual speakers with aphasia

# Analysis of Thematic Structure

- Proportion of utterances with an undetermined thematic structure (UTS)
- Distribution and complexity of argument structures (PAS) produced

  e.g. 1 'Cinderella cried'

  2 'The fairy godmother waved the wand'

  3 'She turned the mouse into a coachman'

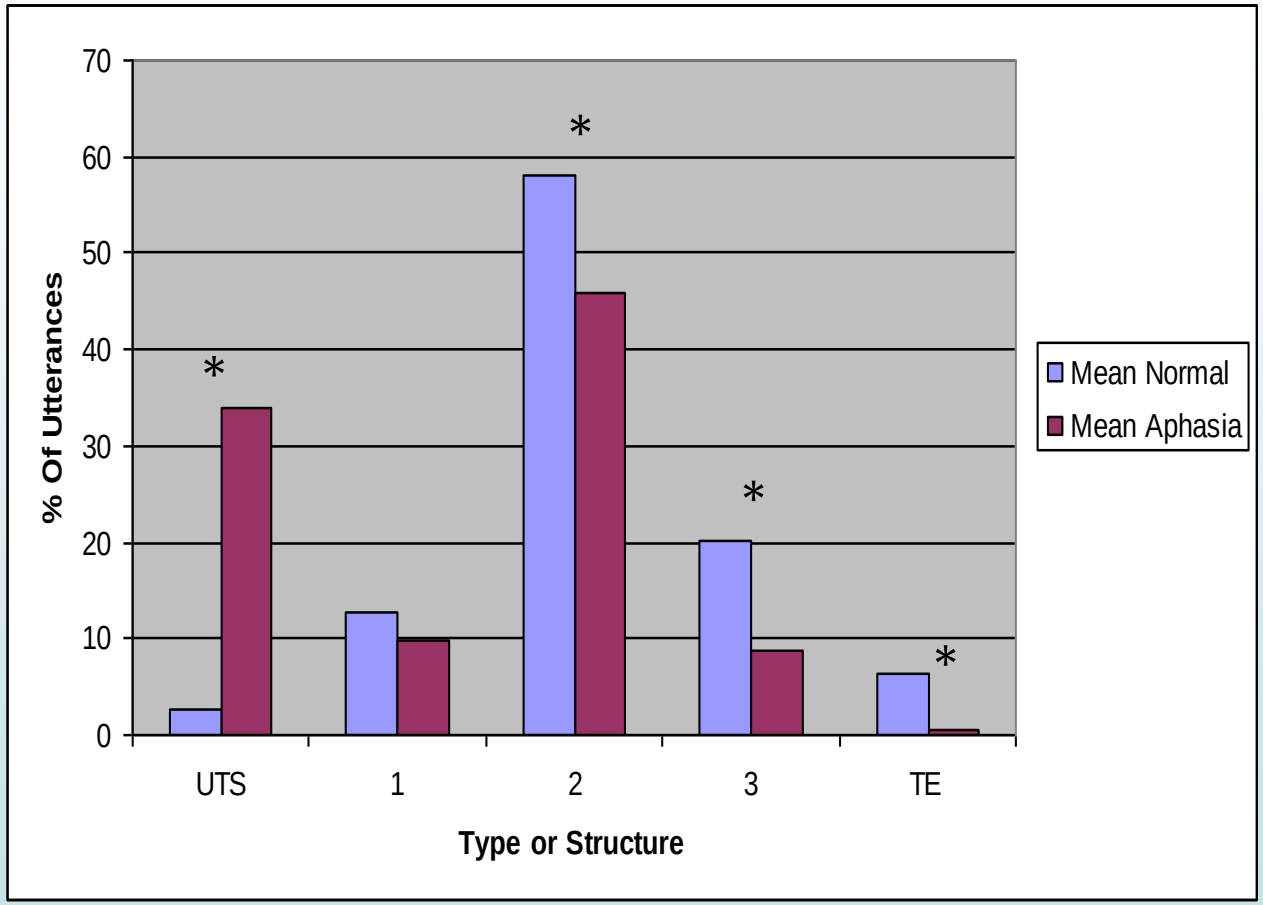
- Proportion of complex utterances with thematic embedding (TE)

  e.g. 'so she went to the ball to dance with the prince who was very handsome'

- Omission of obligatory verb arguments

  e.g. 'Cinderella fetched'

# Analysis of Thematic Structure




Significant difference between normal participants and PWA

- Mean thematic complexity
- % of UTS, 2 argument, 3 argument and utterances with TE
- % of obligatory arguments omitted

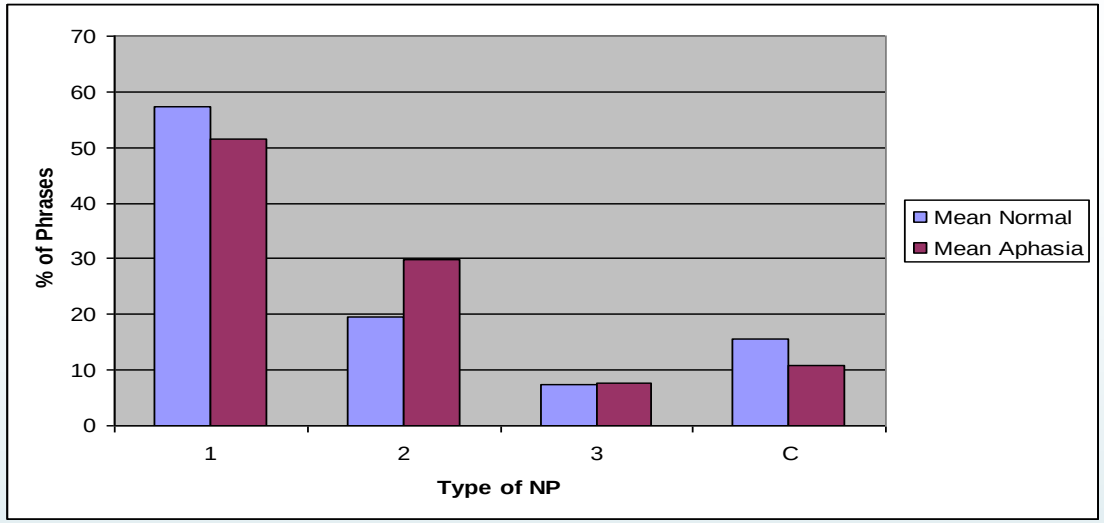
No significant difference between fluent and non-fluent participants for mean thematic complexity

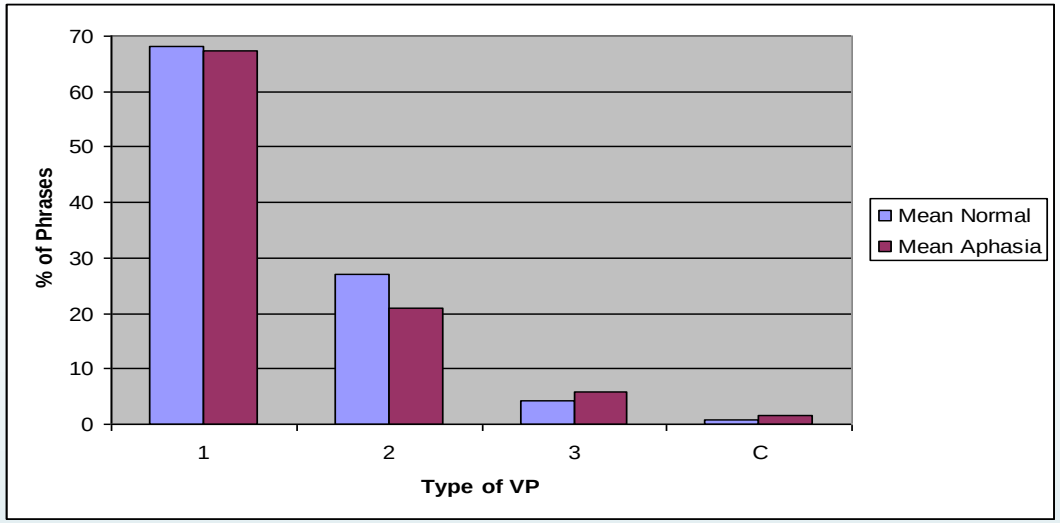
Fluent participants omitted significantly more obligatory arguments than non-fluent participants

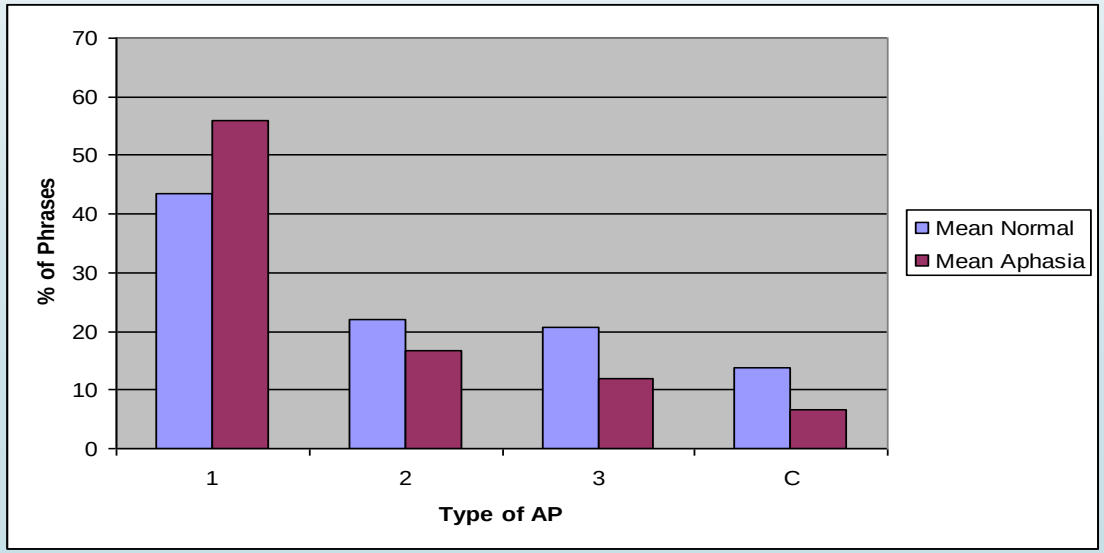
# Analysis of Phrasal Structure

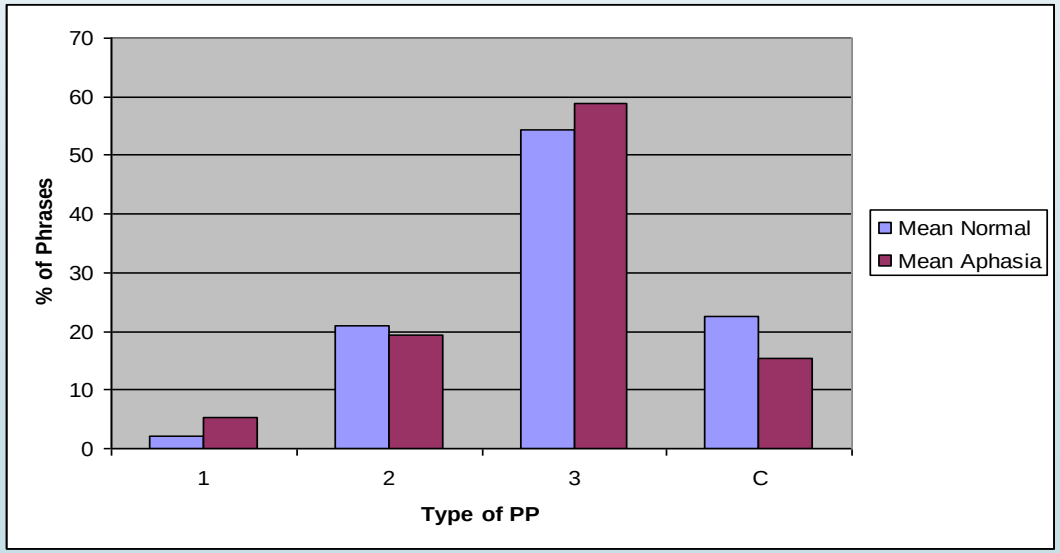
- Complexity of noun phrases (NP)
- Complexity of verb phrases (VP)
- Complexity of adjectival phrases (AP)
- Complexity of prepositional phrases (PP)
- Errors involving the use of pronouns, determiners, auxiliaries and prepositions.

# Analysis of Phrasal Structure




No significant difference between PWA and normal controls (except AP)

No significant difference between non-fluent and fluent speakers

# Analysis of Phrasal Structure: Phrasal Errors

- Normal control participants produced very few errors

| People with Aphasia | Mean % Error | Range | Type of Error |
|---|---|---|---|
| Determiners | 14.04 | 0-50 | Omissions & Substitutions |
| Pronouns | 4.54 | 0-25 | Substitutions |
| Prepositions | 10.68 | 0-50 | Omissions & Substitutions |
| Auxiliaries | 16.38 | 0-67 | Mainly omissions |

# Analysis of Morphological Structure

- Frequency of use
  - Regular morphemes – plural ‘s’, possessive ‘s’, third person ‘s’, past ‘ed’, progressive ‘ing’ and perfect ‘en’
  - Irregular forms – irregular plurals and irregular past tense forms
- Errors in use

# Analysis of Morphological Structure: Frequency of Use

| | Normal Control Participants Mean Frequency | People with Aphasia Mean Frequency |
|---|---|---|
| Plural ‘s’ | 10.60 | 5.05* |
| Irregular Plural | 1.85 | 0.59* |
| Possessive ‘s’ | 0.95 | 0.09* |
| Past ‘ed’ | 18.35 | 2.45* |
| Irregular Past | 22.05 | 6.45* |
| Progressive ‘ing’ | 4.70 | 3.68 |
| Perfect ‘en’ | 0.75 | 0.05* |
| 3rd Person ‘s’ | 1.15 | 3.45 |

* Significant difference between normal control participants and people with aphasia

# Analysis of Morphological Structure: Errors

- Normal control participants produced very few errors

| People with Aphasia | Mean % Error | Range | Type of Errors |
|---|---|---|---|
| Plural ‘s’ | 11.00 | 0-54.55 | Omission |
| Irregular Plural | 0 | n/a | n/a |
| Possessive ‘s’ | 0 | n/a | n/a |
| Past ‘ed’ | 7.14 | 0-50.00 | Omission & Substitution |
| Irregular Past | 4.89 | 0-33.33 | Substitution |
| Progressive ‘ing’ | 2.00 | 0-40.00 | Omission & Substitution |
| Perfect ‘en’ | 0 | n/a | n/a |
| 3rd Person ‘s’ | 23.02 | 0-100 | Omission |

# Relationship between thematic, phrasal & morphological structure

| People with Aphasia | Mean Phrasal Complexity | Mean % Phrasal Errors | Mean % Morphological Errors |
|---|---|---|---|
| **Percentage UTS** | r = -0.274<br>p = 0.217 | r = -0.082<br>p = 0.716 | r = 0.029<br>p = 0.097 |
| **Mean PAS Complexity** | r = 0.138<br>p = 0.541 | r = -0.028<br>p = 0.210 | r = -0.542<br>p = 0.009* |
| **Percentage Argument Omission** | r = -0.116<br>p = 0.608 | r = 0.038<br>p = 0.866 | r = 0.226<br>p = 0.312 |

# Relationship between rate and thematic, phrasal & morphological structure

- No significant correlation between rate of speech and any of the other parameters
  - % UTS r = -0.215 p = 0.336
  - PAS Complexity r = 0.305 p = 0.168
  - Argument Omission r = 0.338 p = 0.124
  - Phrasal Complexity r = 0.175 p = 0.437
  - Phrasal Errors r = 0.129 p = 0.568
  - Morphological Errors r = -0.011 p = 0.963

# Individual Performance

- People with aphasia thought to be impaired if fell outside 2 st dev of normal mean
- For some individual parameters e.g. thematic embedding – large amount of normal variation
- Most people with aphasia presented with a combination of thematic, phrasal and morphological difficulties
  - Across individuals, dissociations across parameters within each level of representation and across levels of representation
  - Varied severity of those difficulties

Table 7
Summary of the performance of individual speakers with aphasia on parameters associated with the production of the functional and positional levels of representation

| | Fluency of speech | Functional level representation | | | Positional level representation | | |
|---|---|---|---|---|---|---|---|
| | | Percentage UTS | PAS complexity | Omission arguments | Phrasal complexity | Phrasal errors | Morphological errors |
| AL | Non-fluent | | | | ✓ | | |
| AM | Non-fluent | | ✓ | | ✓ | ✓ | ✓ |
| BG | Non-fluent | | | | ✓ | | ✓ |
| BM | Non-fluent | | | | ✓ | | ✓ |
| CG | Non-fluent | | ✓ | ✓ | ✓ | | |
| DM | Non-fluent | | | ✓ | | | |
| GW | Non-fluent | ✓ | ✓ | | ✓ | | ✓ |
| HW | Non-fluent | | ✓ | | ✓ | | ✓ |
| IB | Non-fluent | | ✓ | | | | |
| JM | Non-fluent | | | ✓ | ✓ | | ✓ |
| JS | Fluent | | ✓ | | ✓ | | |
| KD | Non-fluent | | | ✓ | ✓ | | |
| MK | Non-fluent | | ✓ | | ✓ | | |
| ML | Fluent | ✓ | ✓ | | ✓ | | |
| NB | Fluent | | ✓ | | ✓ | | ✓ |
| PW | Fluent | | ✓ | | ✓ | | |
| RN | Fluent | | ✓ | ✓ | ✓ | | |
| RS | Non-fluent | | ✓ | ✓ | ✓ | | ✓ |
| SS | Non-fluent | | ✓ | | ✓ | | ✓ |
| TF | Non-fluent | | ✓ | | ✓ | | |
| TJ | Non-fluent | | ✓ | ✓ | | ✓ | ✓ |
| VC | Fluent | | ✓ | ✓ | ✓ | ✓ | |

✓, retained (within normal limits); , impaired (outside 2 SD of normal mean).

See: Webster, J., Franklin, S., & Howard, D. (2007). An analysis of thematic and phrasal structure in people with aphasia: What more can we learn from the story of Cinderella? *Journal of Neurolinguistics, 20, 363-394.*

# Conclusions

- Comprehensive analysis – importance of considering both frequency of production and errors
- Analysis enabled features to be linked to processes involved in normal sentence production
- Evidence for independence of processes involved in production of thematic structure, phrasal structure and morphology
- Relative contribution of thematic, phrasal and morphological difficulties
- Features of sentence production independent of speech fluency (rate of speech)

# Conclusions

- Highlights importance of understanding normal performance
  - Limitations of sample e.g. complex sentences, varied verb tense
  - Normal variability
- Clinically, important to look at the characteristics of an individual's sentence production
- But: Detailed analysis can be time consuming

# A Checklist for Clinical Use

**Functional Level Representation**

Difficulties producing the thematic structure of the sentence at the functional level representation may be characterised by:

- Word retrieval difficulties – possibly involving the production of hesitations, semantic errors and a reliance on pronouns and 'semantically light' verbs e.g. 'have', 'do', 'make', 'be'
- A high proportion of single words and phrases with reduced production of sentences
- A reliance on simple, one and two argument sentences.

See Webster, J., Morris, J., Whitworth, A., & Howard, D. (2009). *Newcastle University Aphasia Therapy Resources: Sentence Processing.* University of Newcastle upon Tyne

# A Checklist for Clinical Use

**Positional Level Representation**

Difficulties producing the grammatical structure of the sentence at the positional level representation may be characterised by:

- Word retrieval difficulties - possibly involving the production of hesitations, semantic errors and phonological errors
- A reliance on simple, unelaborated phrasal structure
- Errors involving the omission and/or substitution of function words e.g. pronouns, prepositions, auxiliaries and determiners
- Errors involving the omission and/or substitution of bound grammatical morphemes e.g. noun and verb morphology.

See Webster, J., Morris, J., Whitworth, A., & Howard, D. (2009). *Newcastle University Aphasia Therapy Resources: Sentence Processing.* University of Newcastle upon Tyne

Cinderella and um .. sister one two sister and ball .. Cinderella ball and Cinderella ball .. no ball .. and sister one two sister and um .. off .. off and um .. nice nice one two two sister and ball ball .. nice ball um .. off and um .. yes and Cinderella and crying yes crying .. and lady wand .. wand lady

two sisters have got an ….invitation . erm and cinderella's .. got none erm ..... the fairy godmother ...erm ..... she .. has erm ..... a carriage and horses.... the horses are horses have mice and the pumpkin no horses are mice and carriage is a pumpkin

somebody wants to go to the palace they want to go to the ball don't they but erm she can't go because she has no decent clothes and they're all raggy and everything else and she's working too hard so the two sisters they're working Cinderella has to get them all dressed up and their lovely clothes and everything to make sure it's nice for the palace

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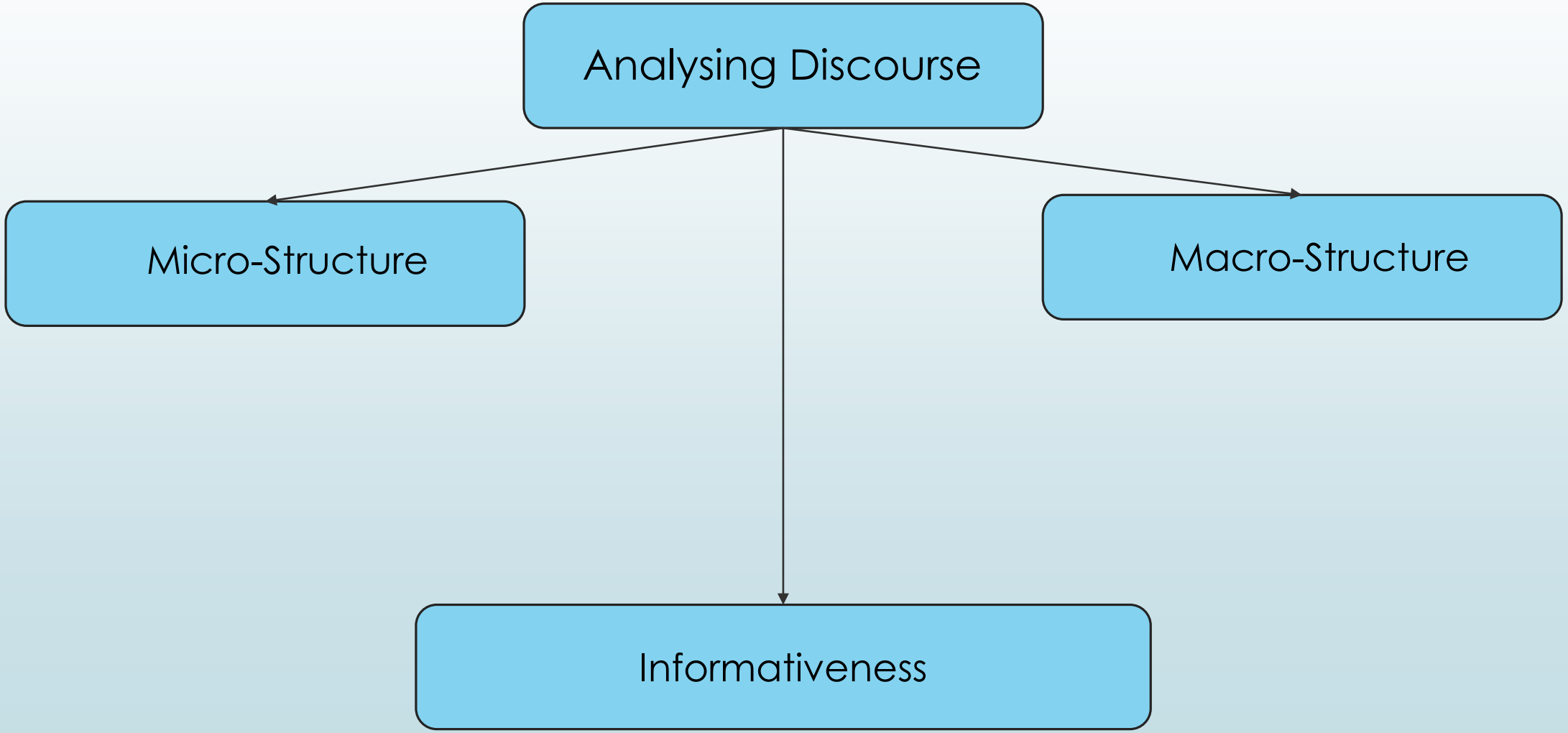
# Analysing discourse …..multi-level analyses

# Analysing Discourse: Focus of Analysis



# Multi-level: Analysis of macro- and micro-structure

Some examples:

- Bastiaanse et al. (1996) – structural (within and across sentences) & lexical measures
- Glosser & Deser (1991) local & global coherence, cohesion, structural & lexical measures
- Andretta & Marini (2015) – productivity, structural (MLU, complete sentences), lexical measures & discourse organisation (local & global coherence, cohesion, information content)

See Summary Table (Table 6) in Linnik et al. (2015)

# Study of Discourse Production

**Aims**

- Profile organisational macrostructure across different discourse genres (recount, procedure, exposition & narrative)
- Influence of age & topic of discourse

**Participants**

- 30 adult speakers across 3 age ranges (20-39 years, 40-59 years & 60+ years)

See: Whitworth, A., Claessen, M., Leitao, S., & Webster, J. (2015). Beyond narrative: Is there an implicit structure to the way in which adults organise their discourse? *Clinical Linguistics & Phonetics, 29(6), 455-481.*

# Study of Discourse Production

**Method** - See Curtin University Discourse Protocol

- 3 x Recount (past injury, weekend, last Christmas)
- 3 x Procedures (scrambling eggs, changing a light bulb, planning an event / meal)
- 3 x Expositions (Bullying, obesity, global warming)
- 1 x Narrative (Cinderella)

**Analysis**

- Organisational structure – elements within orientation, body & conclusion
- Referential cohesion
- Analysis of conjunctions – adversative (e.g. but), causal (e.g. because), conditional (e.g. therefore) and temporal (e.g. then, before)

# Telling stories (narratives)

**Purpose:** To entertain/inform
**Focus:** Sequential specific events

| | | | |
|---|---|---|---|
| 1. Orientation of title/topic, setting context, key characters | → | who? what? where? when? | Beginning |
| 2. A catalyst event | → | initiating event | Middle |
| 3. Events – usually in time order | → | series of events (e.g .main event, resolving event, etc) | Middle |
| 4. Conflict and resolution (usually) | | | Middle |
| 5. A concluding statement | → | concluding event or comment | End |
| 6 . Evaluation (optional) | → | personal comment / reaction | End |

**Connectives** – time related connectives (e.g. then, next, before)
**Other** - Defined characters, descriptive language, dialogue, usually past tense

# Giving opinions

**Purpose:** To argue or persuade
**Focus:** A thesis presented from a particular point of view

Beginning
Middle
End

1. Overall statement or position → establish point of view
2. Supported statements or assertions → present series of pros and cons
3. Reiteration → restate opening statement/ points

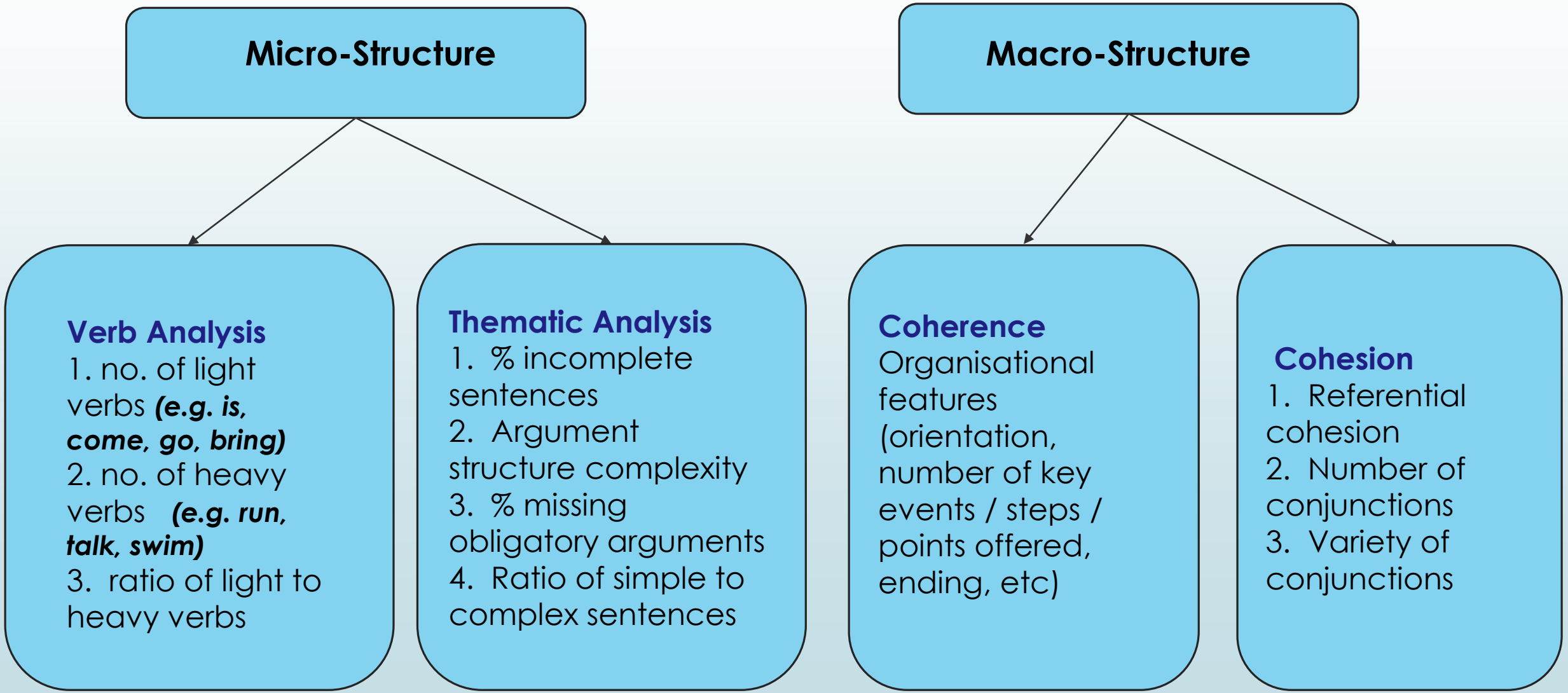
**Connectives** – reasoning connectives (e.g. therefore, so, because)
**Verbs** - relational verbs (being/having) and many mental verbs
**Reference** - specific or generic reference
**Other** - Generalised participants, passives to help structure discourse, nominalisation (actions becoming nouns e.g. pollute becomes pollution)

# Study of Discourse Production

**Summary of Results**

- Normal adult speakers use macrostructure elements to develop and maintain coherence (orientation, body & conclusion)
- Macrostructure elements adhered to different frameworks for different genres of discourse
- Some variation across discourse genres e.g. amount of orienting material, different conjunctions
- Some significant differences across different age groups e.g. number of elements within body
- Individual variation across speakers

# Development of Multi-Level Measure



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# Exploring the Role of Narrative in the Treatment of Aphasia

# The Plan

## In the beginning….

- Background – sentence, narrative and discourse production
- Analysing narrative – role within assessment and diagnosis of sentence production difficulties
- Analysing discourse

## In the middle….

- **What we know about language based intervention for word retrieval and sentence production**
- **Multi-level therapies: The NARNIA study**

## In the end….


- Comparing outcome measures

# Aim of Therapy for Aphasia

**Webster, Whitworth & Morris (2015)**

- Maximise gains in everyday communication
- Reduce the disability associated with aphasia
- Increase participation

- Many people with aphasia want to improve their language and communication skills

# Language-focused aphasia treatment: What do we know?

**Treatments for improving retrieval of single words (nouns)**

- Large evidence base (see reviews in Nickels, 2002 & Whitworth, Webster & Howard, 2014)
- Improved retrieval of treated words
- Limited generalisation to untreated words
  - Therapy developing use of a strategy which can be applied across words (e.g. Nickels 1992)
  - Generalisation more likely in participants with good semantics and poor phonological encoding (see Best et al., 2013)

# Language-focused aphasia treatment: What do we know?

- Limited investigation of impact on word retrieval in connected speech
- Some examples of gains in connected speech
  - Rose & Douglas (2008) – gains in number of nouns produced in procedural discourse e.g. 'animals' when describing 'going to zoo'
  - Herbert et al. (2008) – performance on naming task related to lexical retrieval in conversation
  - Spencer et al. (2000) – increase In CIU following phonological therapy
  - Best et al. (1997) – gains in rated communicative effectiveness

# Language-focused aphasia treatment: What do we know?

**Treatments for improving retrieval of single words (verbs)**

- Increasing evidence base (see reviews in Conroy, Sage & Lambon Ralph 2006, Webster & Whitworth, 2012 & Whitworth, Webster & Howard, 2014)
- Improved retrieval of treated words
- Limited generalisation to untreated words
- Improved production of sentences around treated verbs (e.g. Marshall et al. 1998, Raymer & Ellsworth, 2002)
- Some generalisation to production of sentences around untreated verbs (e.g. Marshall et al. 1998)

# Language-focused aphasia treatment: What do we know?

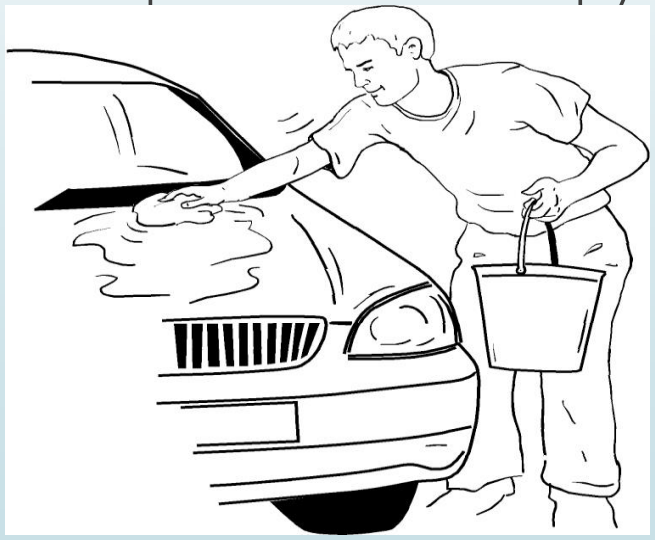
- Studies which have monitored impact of single word verb therapy on production of connected speech (Rose & Sussmilch, 2008, Boo & Rose, 2011, Carragher et al. 2013)
- Some lexical and structural gains in connected speech – but only for some participants
- Carragher et al. (2013) – no significant change in number of verbs in conversation following single word verb therapy
  - No correlation between verb naming and verb retrieval in conversation
  - No correlation between improvement in verb naming and verb retrieval in conversation

# Language-focused aphasia treatment: What do we know?

**Treatments combining work on verb retrieval and sentence production**

Verb and argument structure therapies (e.g. Webster et al. 2005)

- 3 components of therapy:



1. Single verb retrieval

# Language-focused aphasia treatment: What do we know?

**Treatments combining work on verb retrieval and sentence production**

Verb and argument structure therapies (e.g. Webster et al. 2005)

- 3 components of therapy

1. Single verb retrieval

| | | | |
|---|---|---|---|
| **washing** | box | dishes | computer |
| **washing** | towel | brush | flannel |
| **digging** | farmer | doctor | ballerina |
| **digging** | tarmac | hole | carpet |

2. Verb and noun association

# Language-focused aphasia treatment: What do we know?

**Treatments combining work on verb retrieval and sentence production**

Verb and argument structure therapies (e.g. Webster et al. 2005)

- 3 components of therapy:

3. Sentence Generation

| WHERE? | | WHAT WITH? |
|---|---|---|
| in the bathroom | | flannel |
| in the washroom | | washing machine |
| | **WASH** | |
| **WHAT TO?** | | **WHO?** |
| face | | man |
| clothes | | woman |
| car | | dog |

# Language-focused aphasia treatment: What do we know?

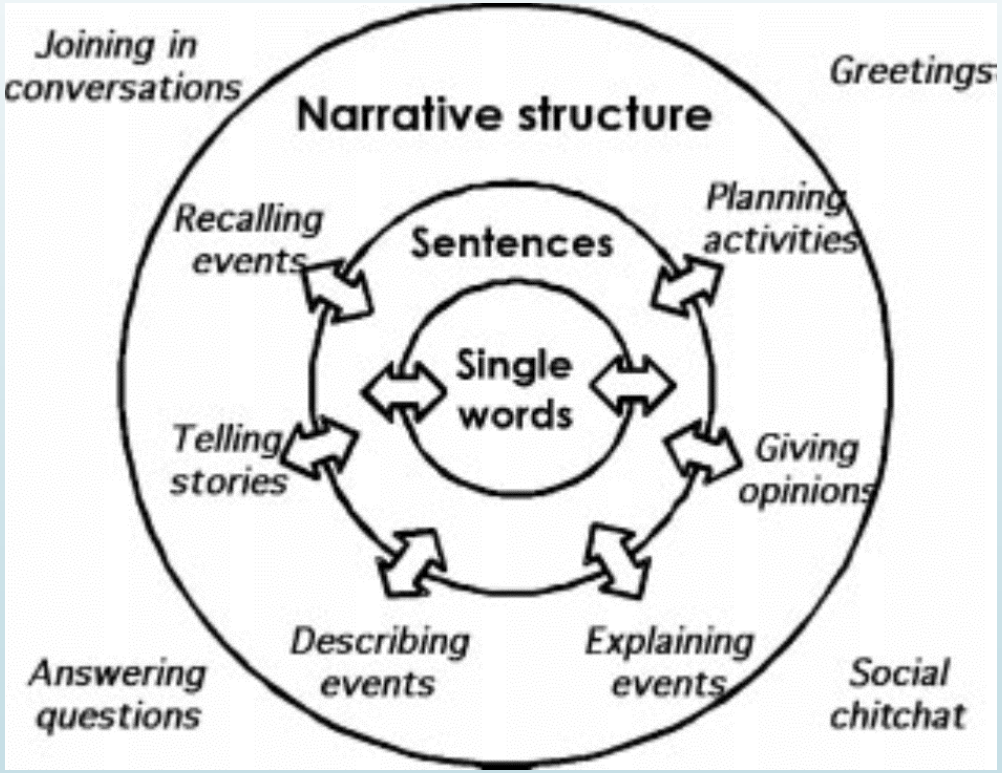
- Another example – Verb Network Strengthening Treatment (VNeST) (Edmonds & colleagues 2009, 2011, 2015)
- Outcome of these therapies
  - Gains in retrieval of treated verbs
  - Some general gains on tests of verb and noun retrieval as consequence of VNeST
  - Improved sentence production around both treated and untreated verbs
  - Structural changes in sentence production in connected speech – reduction in number of single phrases, increase in number of sentences, increase in number of complete sentences, increase in complexity of sentences
  - Not clear if therapies have impact on lexical content of connected speech e.g. diversity of verbs

# Language-focused aphasia treatment: What do we know?

- Structured language focused aphasia treatment results is effective in changing performance on constrained tasks
- Gains seen on treated items and generalisation to untreated items dependent on therapy task and nature of person's difficulties
- Limited evidence that word retrieval therapies result in change in word retrieval in connected speech
- Combining work on verb retrieval and sentence production has been shown to result in structural changes in connected speech
  - BUT: Not every participant shows significant improvement
- Major leap from words and sentences to using language in everyday speaking contexts

# And so…. a novel approach to treatment

- Developing a novel intervention based around how people structure their talk - looking beyond the word and sentence to the structure of narratives




Relationship between word, sentence and narrative structures in real life communication (Whitworth, 2010)

# And so…. a novel approach to treatment

- Multi- level therapy combining work on words, sentences & discourse

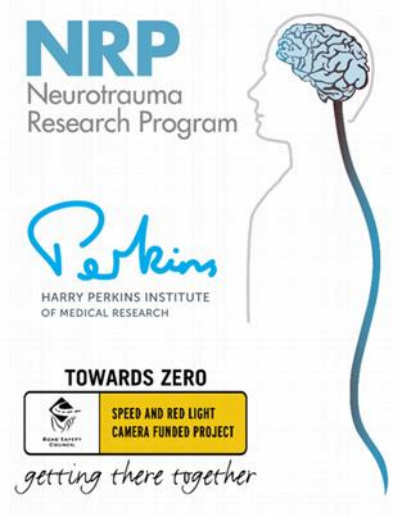
- Combine what we know about effective treatment for verb and sentence production difficulties with knowledge about organisation of discourse
  - Verb & argument structure therapies (e.g. Webster et al. 2005)
  - Developmental frameworks for discourse organisation (Stein & Glenn, 1979, 1982)

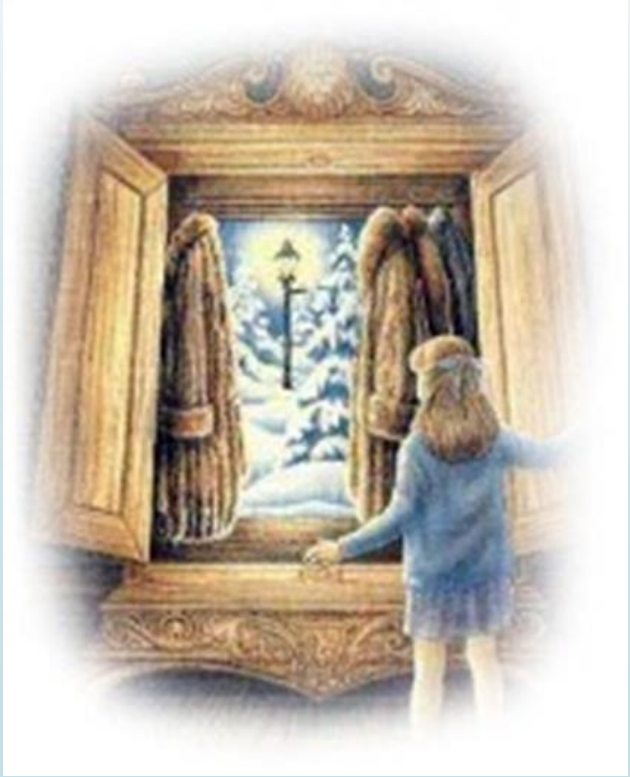
- Single case studies – positive preliminary findings (Whitworth, 2010)

# NARNIA: A Novel Approach to Real-life communication: Narrative Intervention in Aphasia


Dr Anne Whitworth (Curtin University, Australia)

Prof Graeme Hankey (UWA, Australia)
Dr Suze Leitão (Curtin University, Australia)
Dr Jade Cartwright (Curtin University, Australia)
Dr Janet Webster (Newcastle University, UK)
Ms Jan Zach (State Rehabilitation Service, WA)
Ms Vanessa Wolz (Curtin University, RPH)
Prof David Howard (Newcastle University, UK)

# NARNIA study

- Prospective, single blind Randomised Control Trial (RCT)
- 14 people with mild-moderate aphasia following stroke
- Comparison of i) Usual care and ii) NARNIA intervention

| Intervention Group | *n* | Aphasia severity (WAB-B) | Age (years) | TPO (months) |
|---|---|---|---|---|
| **NARNIA** | 8 | 8.17<br>(sd 1.12)<br>4 mild, 4 moderate | 63<br>(range: 42-87) | 20.9<br>(range: 2 - 49) |
| **Usual Care** | 6 | 7.75<br>(sd 1.33)<br>3 mild, 3 moderate | 55<br>(range: 37-66) | 32.6<br>(range: 3 - 156) |

# NARNIA study: Inclusion criteria

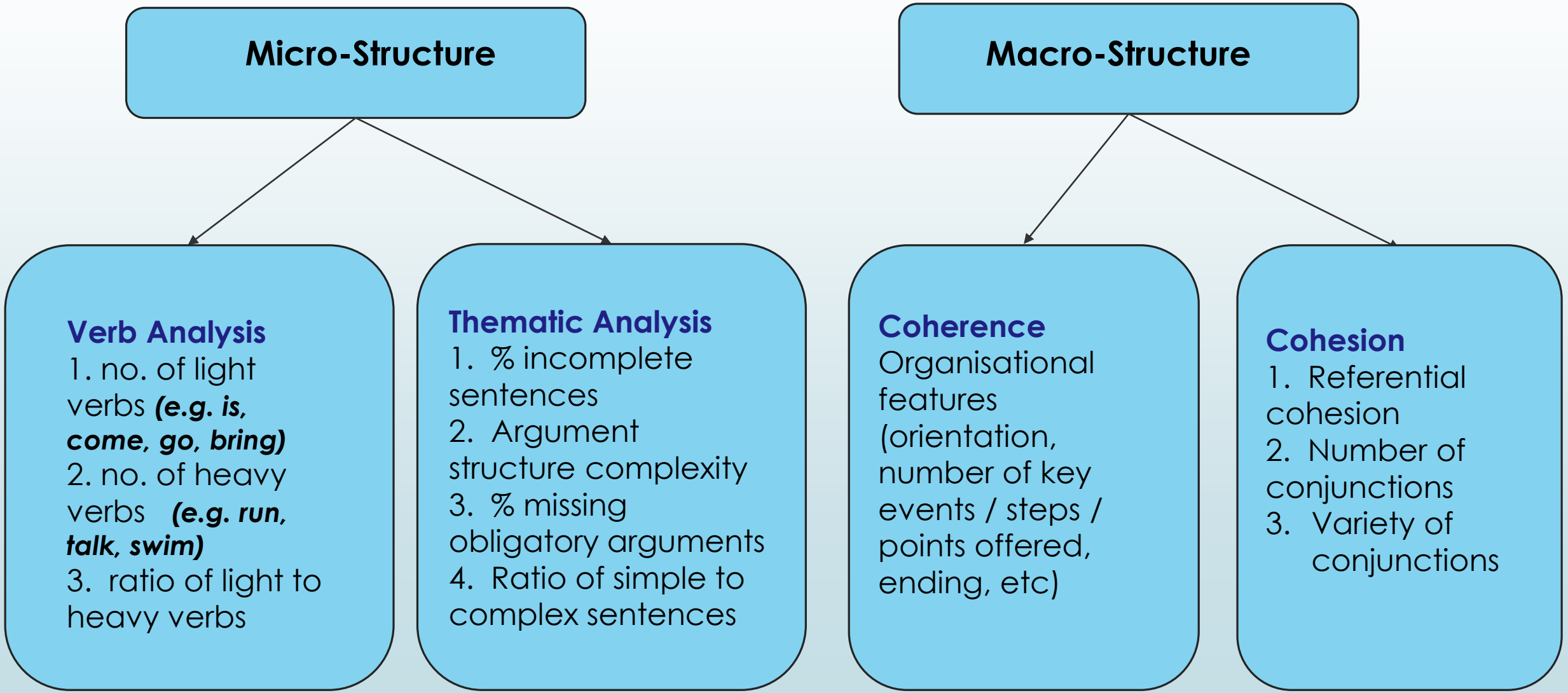
- Recruited from in- and out-patient rehabilitation services
- Neurologically stable
- No previous aphasia or progressive cognitive difficulties
- Proficient in English prior to their stroke
- Apraxia or dysarthria not primary area of difficulty

# NARNIA study

- Background assessment
- Primary outcome measure: Curtin University Discourse Protocol (Whitworth et al. 2015)
- 3 data points (pre, post and 5 weeks post)
  - 3 x Recount (past injury, weekend, last Christmas)
  - 3 x Procedures (scrambling eggs, changing a light bulb, planning an event / meal)
  - 3 x Expositions (Bullying, obesity, global warming)
  - 1 x Narrative (Cinderella)
- Treatment - 20 individual sessions with a trained Speech Pathologist, 4 x weekly, over a 5 week period

See Whitworth, A., Claessen, M., Leitao, S., & Webster, J. (2015). Beyond narrative: Is there an implicit structure to the way in which adults organise their discourse? *Clinical Linguistics & Phonetics, 29(6), 455-481.*

# Multi-Level Measure



# Usual care

- Individualised to meet assessed need
- Employed usual practice procedures around goal setting
- Intervention drawn from therapies routinely used in clinical practice (standardised procedure agreed by group of clinicians)
  - Word retrieval
  - Sentence production
  - Reading
  - Writing
  - Functional activities across domains

# NARNIA: Multi-level therapy

**Word level processes**

- Identify and select main **verb** within each event
- Identify and produce the main **nouns**

**Sentence level processes**

- Create a **complete argument structure** around each verb

**Discourse level processes**

- Work with the **narrative framework**
- Identify **connectives** to link sentences (e.g. “and then”, “so”,  after”)

# NARNIA: Multi-level therapy

**Picture sequences**

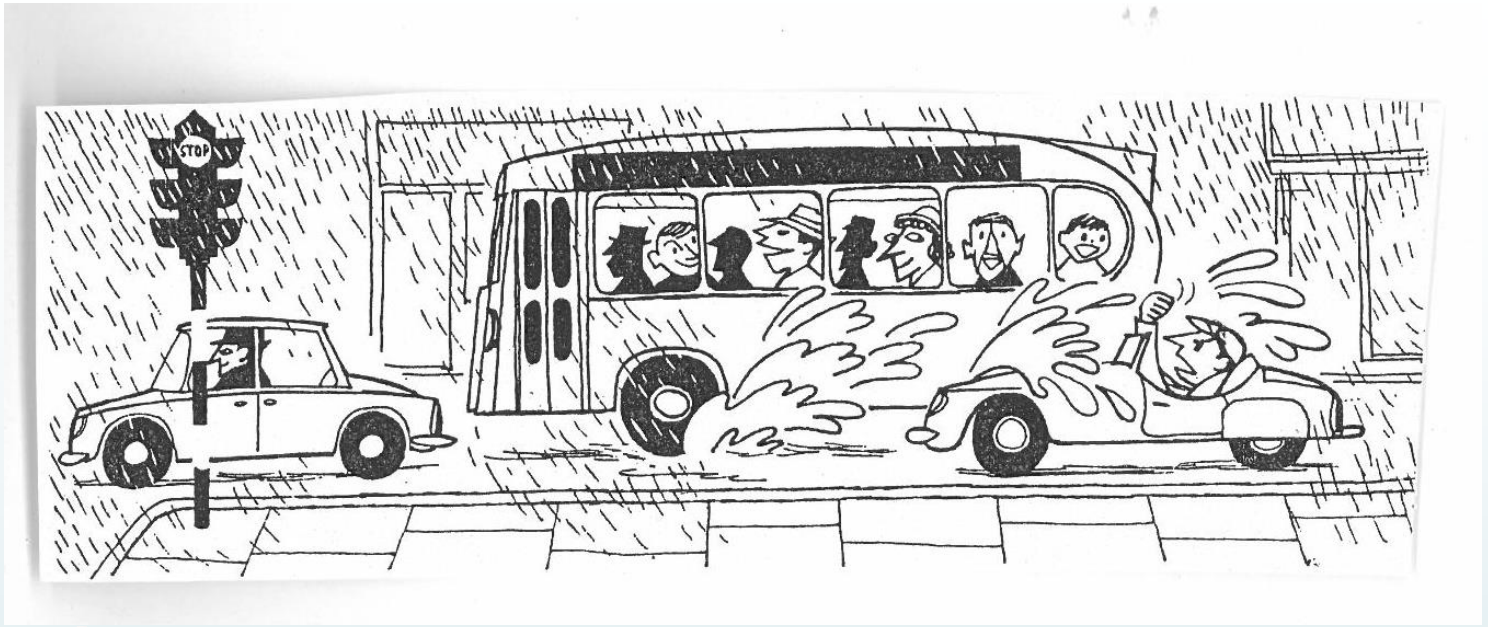
3 events through to 8 events
Progress through identifying:

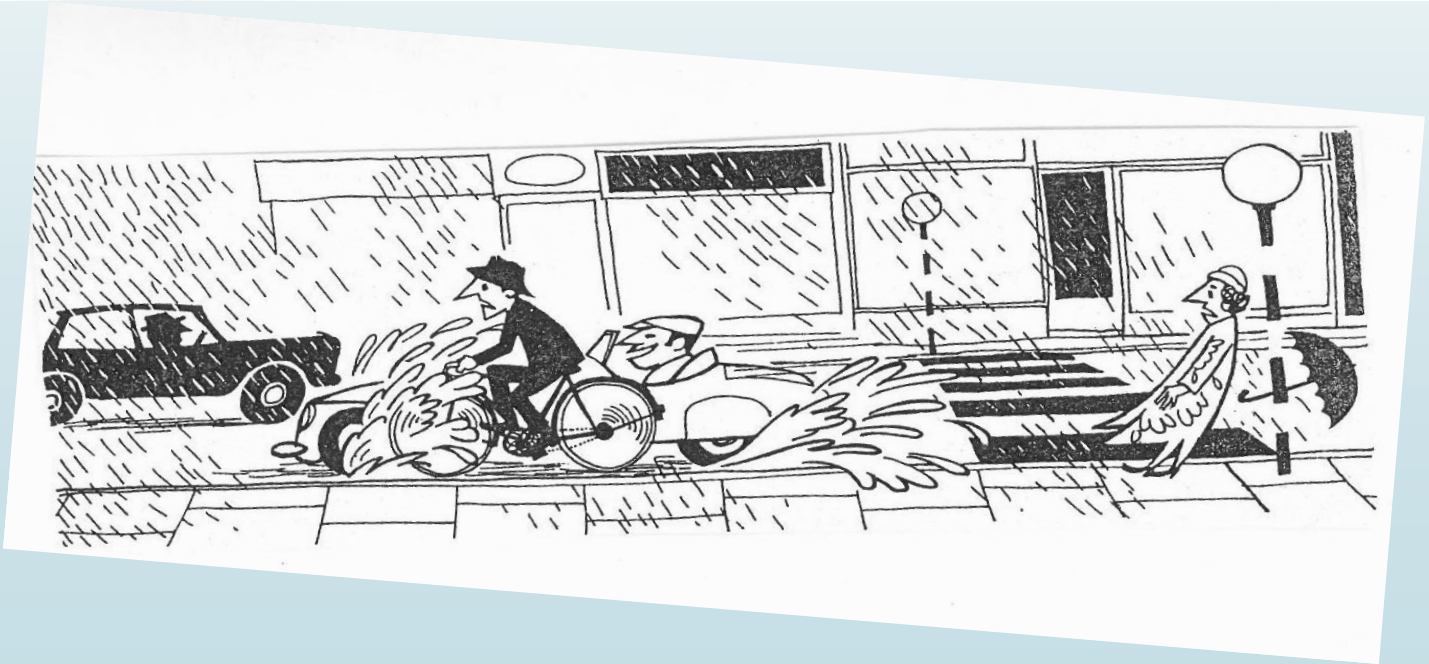
(1) main event / action
(2) verb
(3) nouns
(4) full sentence for each event
(5) narrative framework
(6) connectives

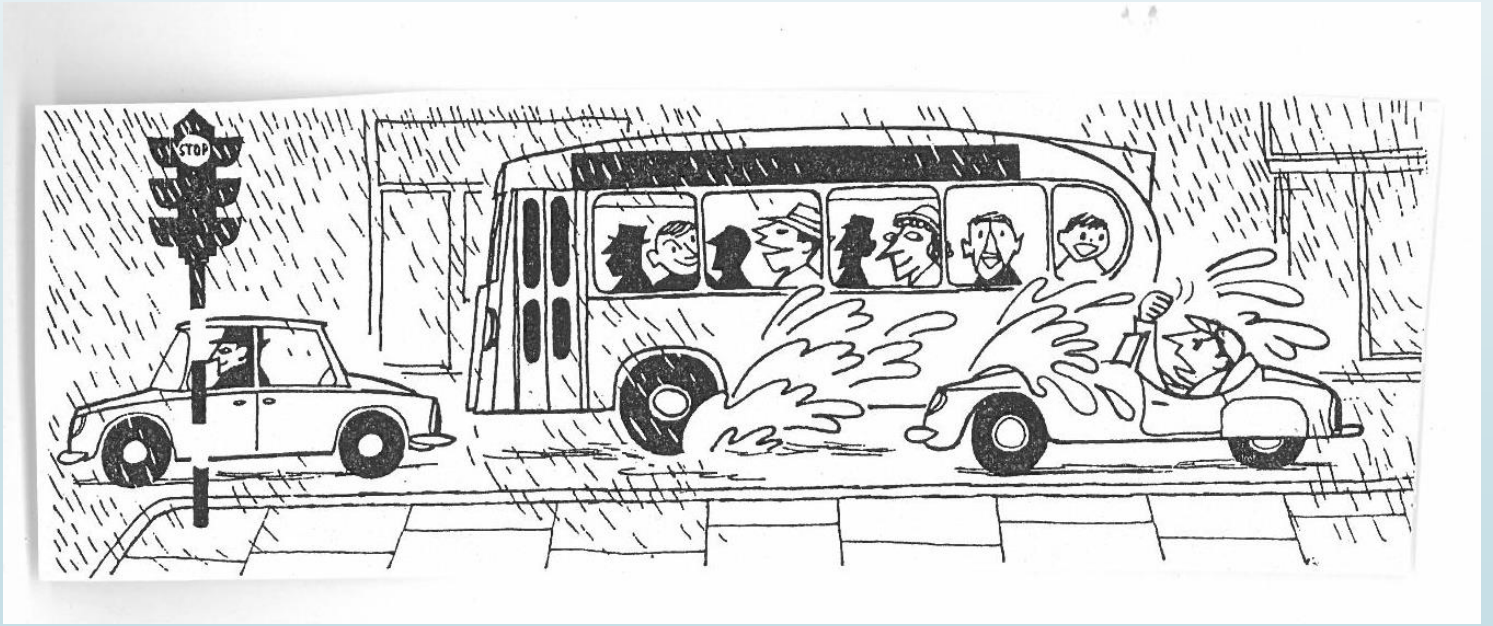
**Discussion of opinions/ideas/beliefs**
picture stimuli
personal experience

**Recall of events**
personal experience

**Planning of future events**
personal experience


STOP




STOP

Word level

ACTOR

ACTION

WHAT

| Who (nouns) | Actions (verbs) | What (subject nouns) |
|---|---|---|
| | | |

## **Sentence level processes:** Verb argument structure

1. **WHO**
*Noun*
*Subject*

+

2. **ACTION**
*Verb*

+

3. **WHAT**
*Noun*
*Object*

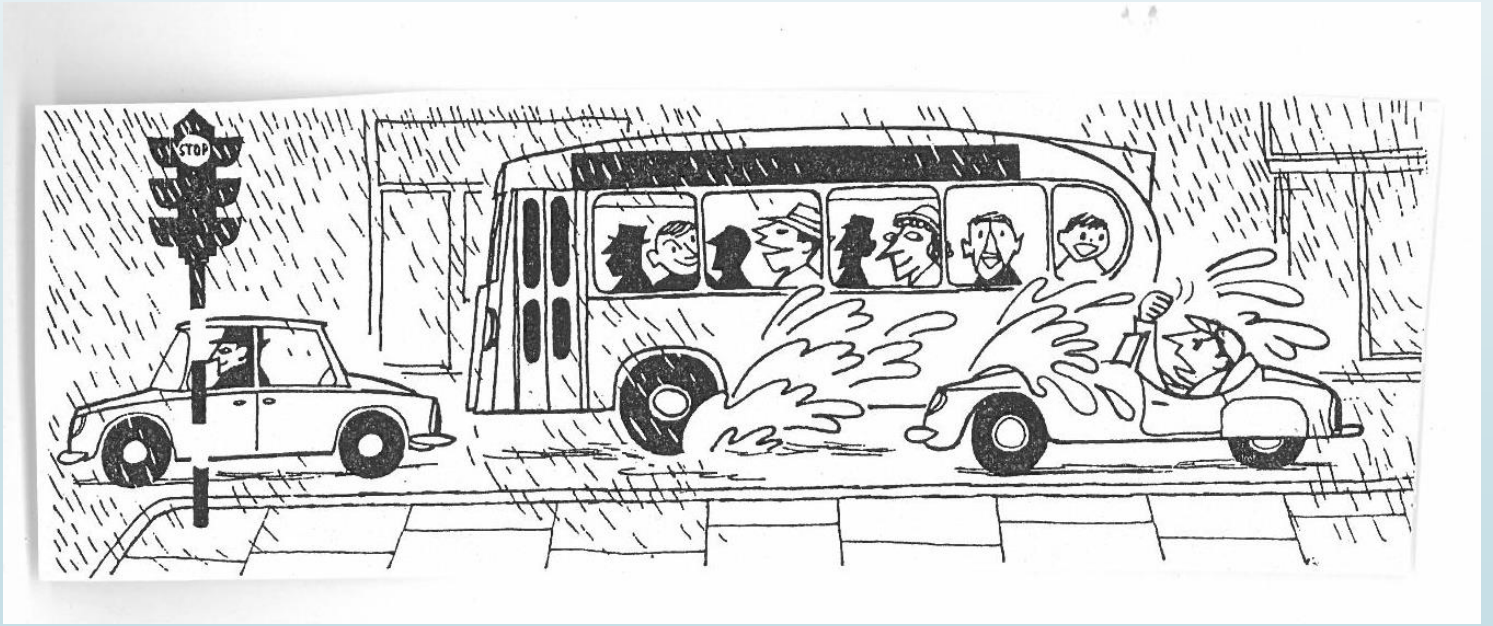
+

**WHEN**
*Time*

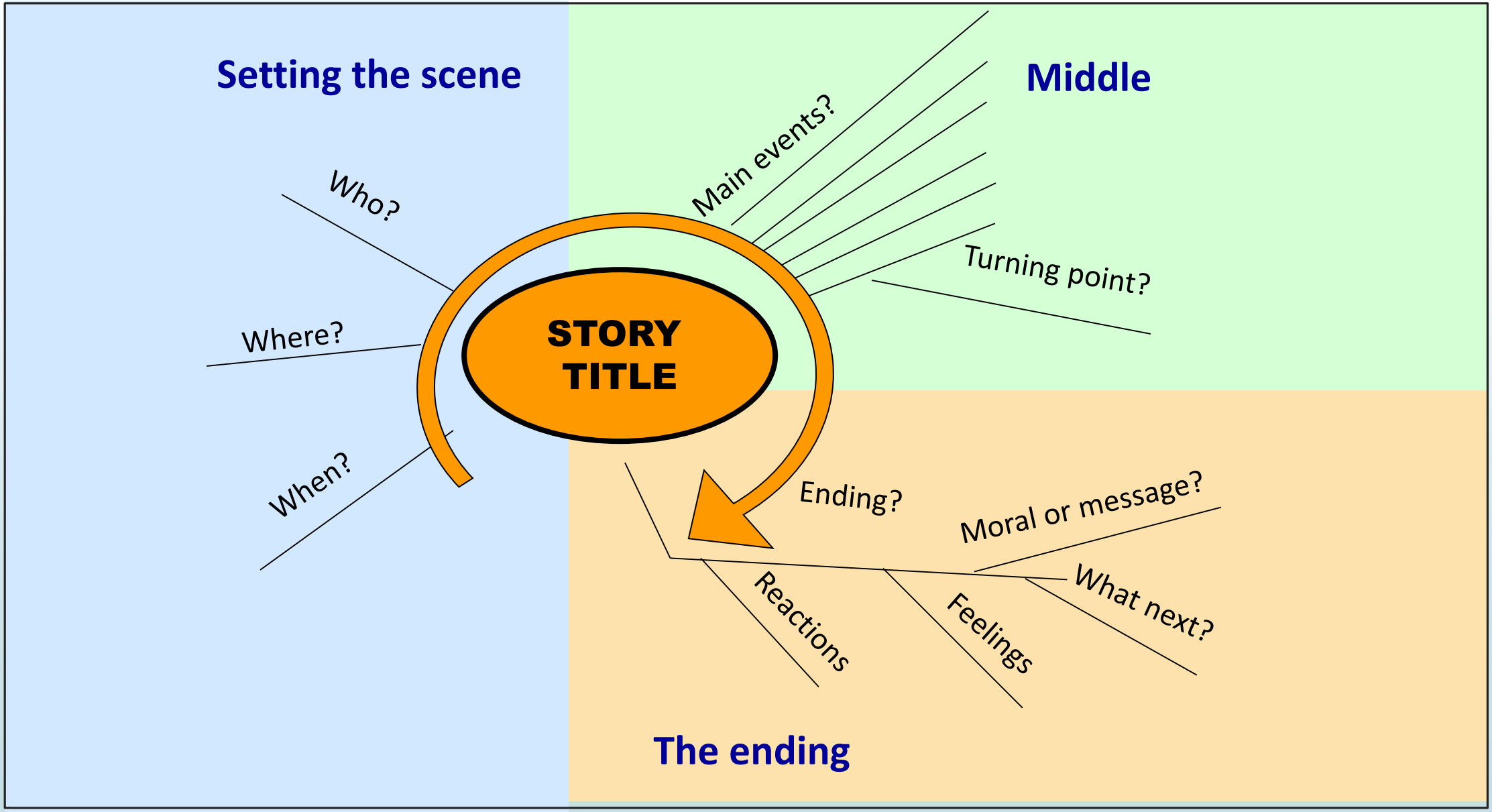
**WHERE**
*Place, location*

**HOW?**
*Instrument, tool*

**OTHER**
?


STOP

# Narratives…


Setting the scene
Middle
Who?
Where?
When?
Main events?
Turning point?
STORY TITLE
Ending?
Moral or message?
What next?
Reactions
Feelings
The ending

## CONJUNCTIONS

**(linking**  **words)**

**Coordinating Conjunctions:** And Or But Nor So For Yet
**Subordinating Conjunctions:** Because Even if As long as While Unless While

## ADVERBS

**(little words for extra information)**

Adverbs are words that describe (modify) verbs, adjectives and other adverbs. They tell us how, when, where, to what extent and why.

| How | When | Where | To what extent |
|---|---|---|---|
| Beautifully, quickly, urgently | After, never, then | Everywhere, here, upstairs | Extremely, no (n't), quite |

## How did I go…?

**Finding the verb (action)** 

1 2 3 4 5 6 7 8

**Finding the nouns (people and things)** 

**Completing sentences** ___+ __ + __

**Setting the scene (beginning)** 

**Linking ideas** 

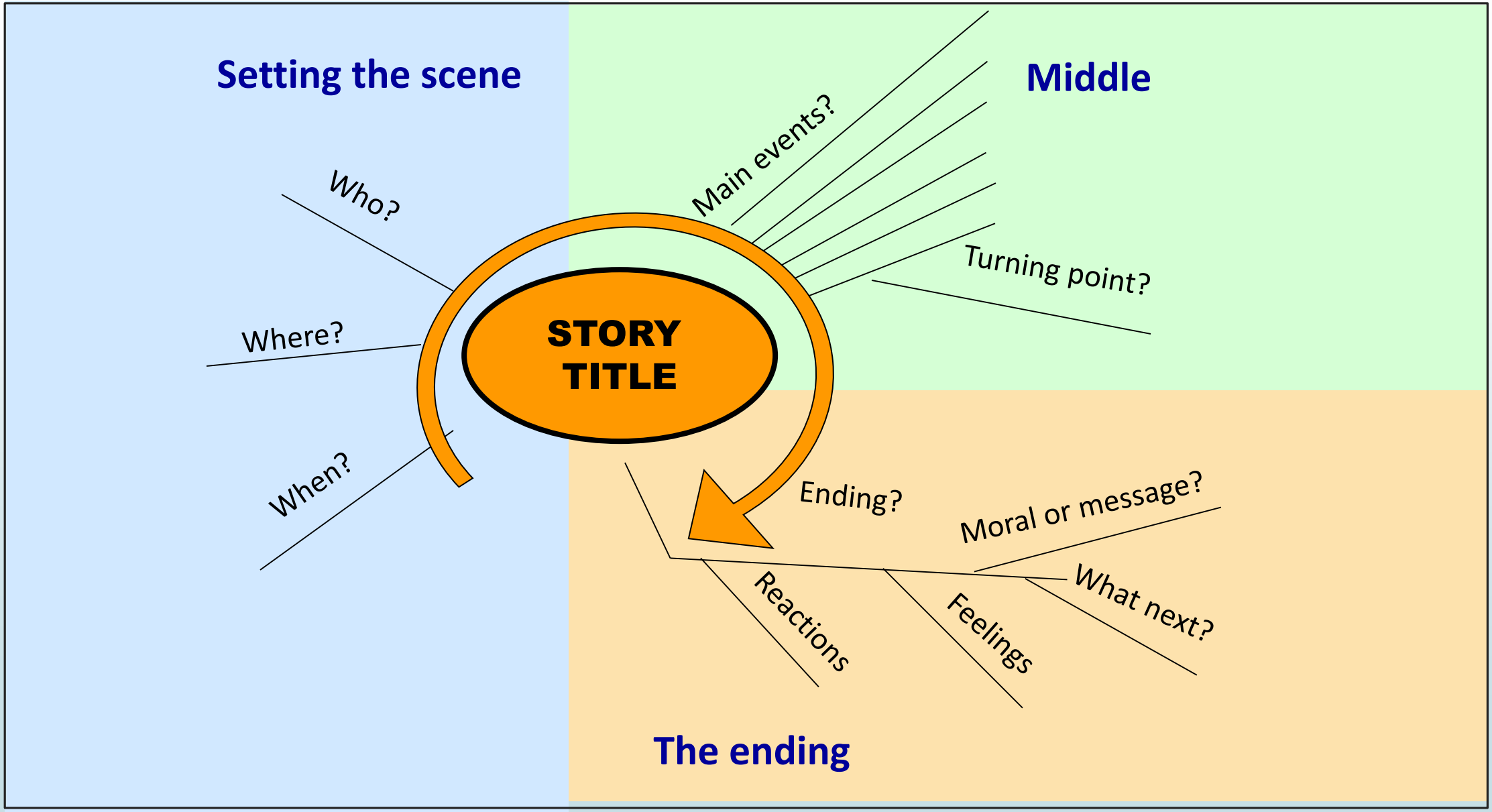
**Ending** 

**Clear story overall?** ☺

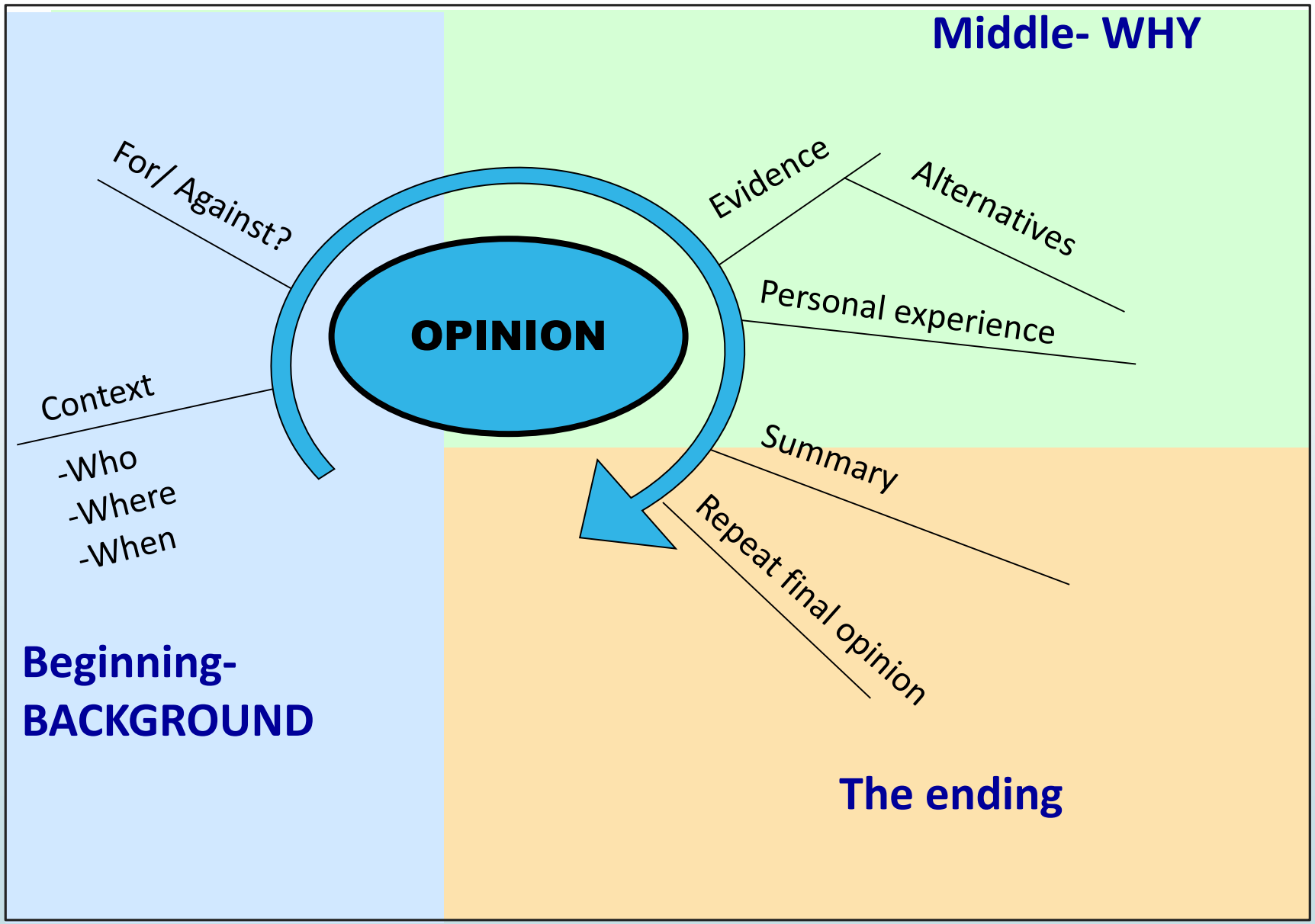
**Self-monitoring**

- Each rated
- Each time

# Narratives…

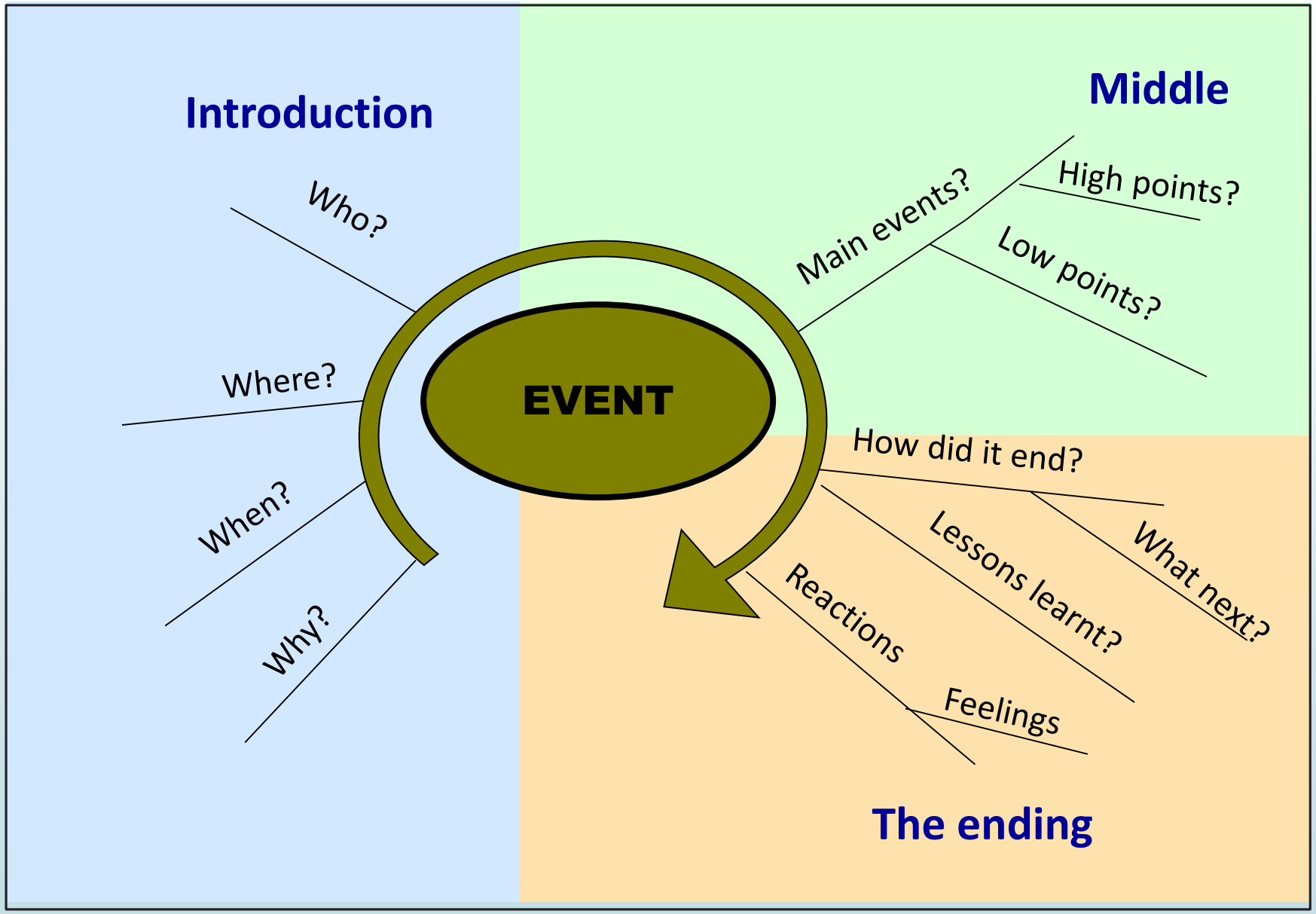

Setting the scene
Middle
Who?
Where?
When?
Main events?
Turning point?
STORY TITLE
Ending?
Moral or message?
What next?
Reactions
Feelings
The ending

# Opinion…

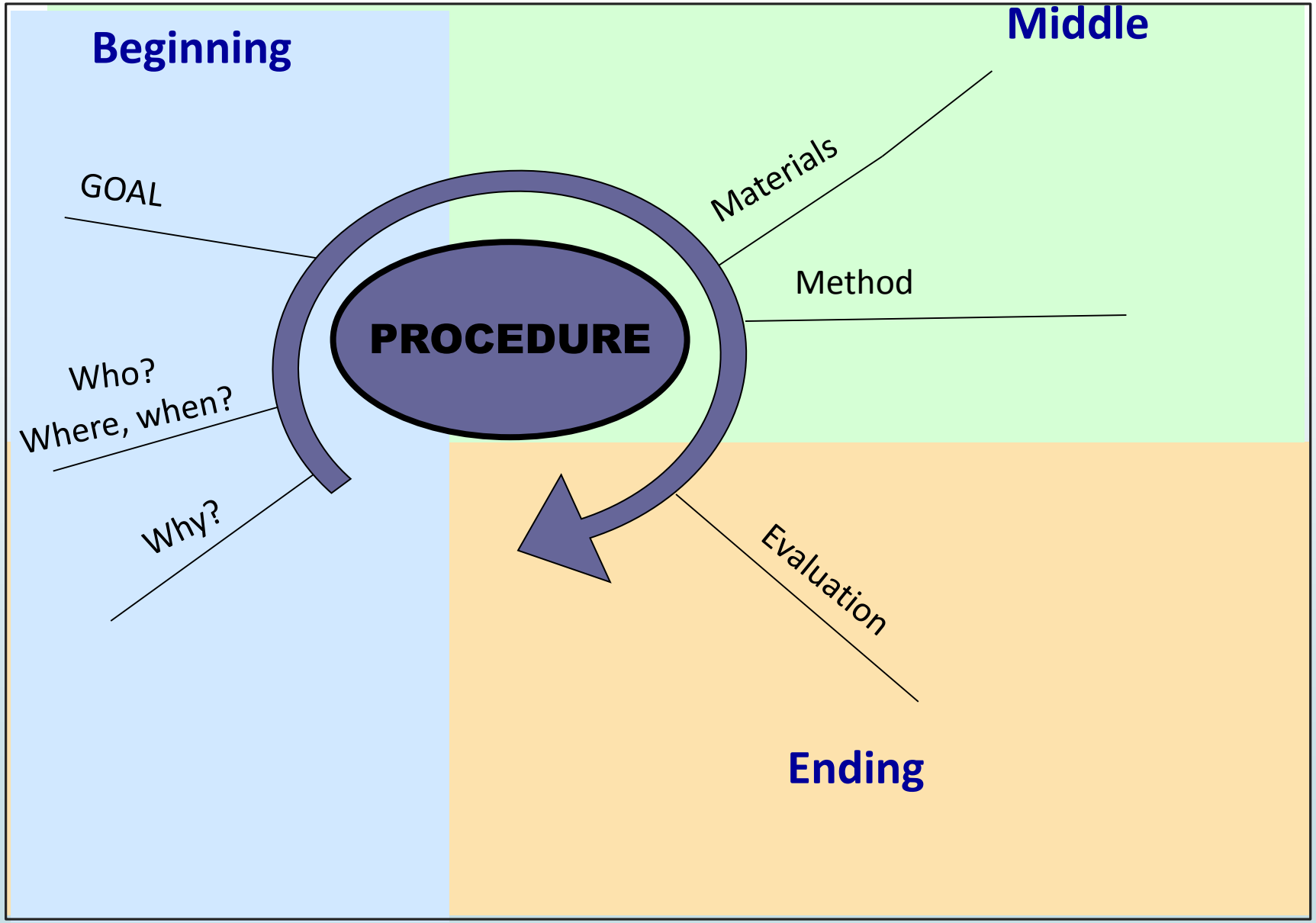

Middle- WHY
For/ Against?
Evidence
Alternatives
OPINION
Personal experience
Context
-Who
-Where
-When
Summary
Repeat final opinion
Beginning-
BACKGROUND
The ending

ColourCards  Skills for Daily Living: Social Behaviour (2002).Speechmark Publishing Ltd.

# Recounts…

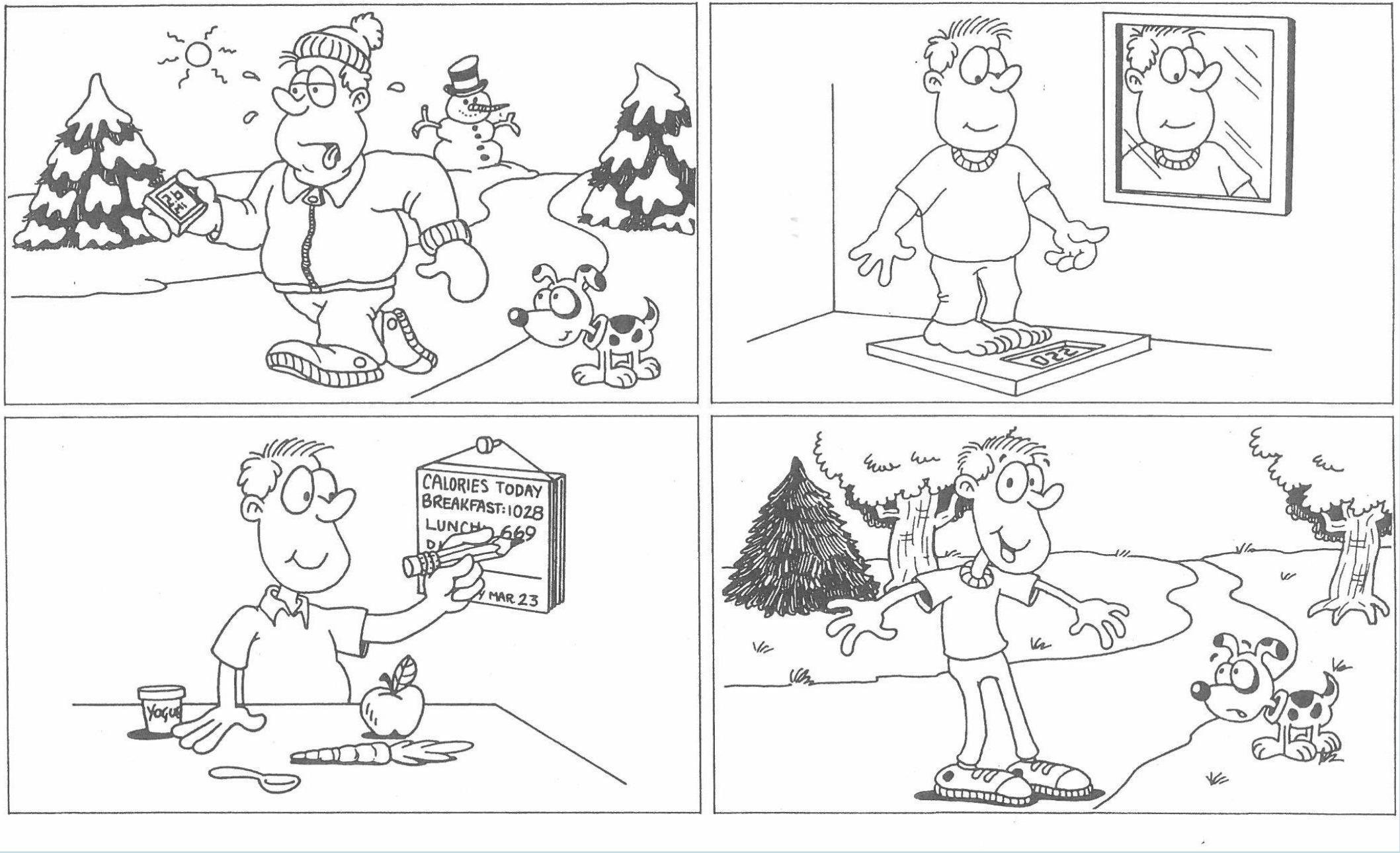

Introduction
Middle
The ending
Who?
Where?
When?
Why?
Main events?
High points?
Low points?
EVENT
How did it end?
What next?
Lessons learnt?
Reactions
Feelings

# Procedures…


Beginning
Middle
GOAL
Materials
Method
PROCEDURE
Who?
Where, when?
Why?
Evaluation
Ending

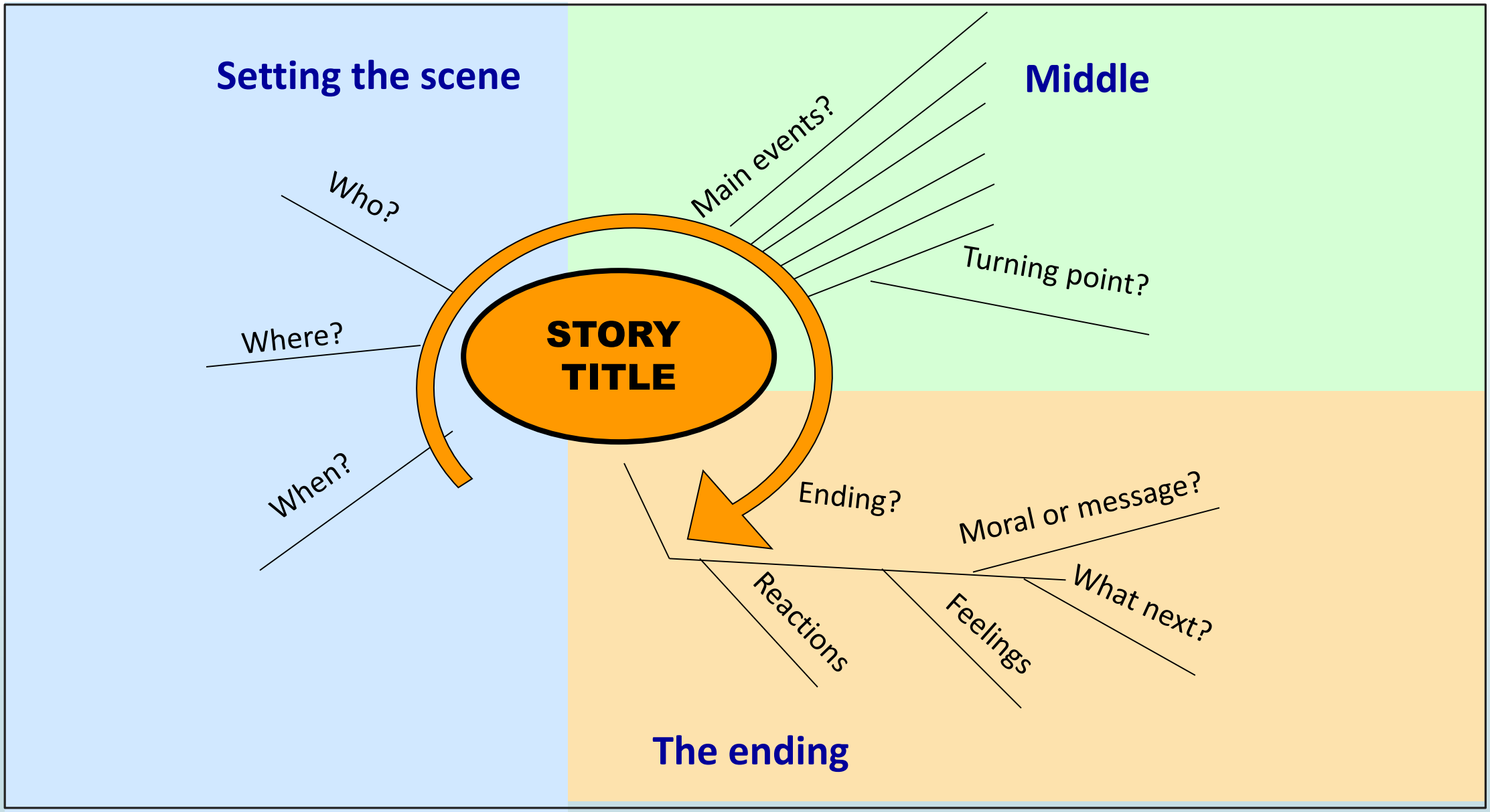
# Losing Weight


"Sequence Plus: Sequence Pictures with Vocabulary". Circuit Publications.


CALORIES TODAY
BREAKFAST: 1028
LUNCH 669
MAR 23
Yogurt


SPOING!

# Narratives… about my job



# Background assessment

| Measures | | *n* | Controls | NARNIA | Usual Care |
|---|---|---|---|---|---|
| **Semantics** | Palm trees and Pyramids | 52 | 51.1 | 48 | 48.3 |
| | Kissing and Dancing Test | 52 | 50.4 | 47 | 46 |
| **Word comp.** | NAVS Verb Comp | 22 | 22 | 21 | 21 |
| **Word retrieval** | OANB - Nouns | 20 | 19.2 | 14.4 | 12.2 |
| | OANB - Verbs | 20 | 18.4 | 17.1 | 15 |
| | NAVS Verb naming | 22 | 20.9 | 17.8 | 17.5 |
| **Sentence comp.** | NAVS Sentence Comprehension | 30 | 29.9 | 26 | 26.3 |
| **Sentence production** | NAVS Argument Structure Production Test | 32 | 31.8 | 29.8 | 26.3 |
| | Sentence generation Test | 25 | 25 | 16.5 | 18.8 |

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# Everyday discourse pre-therapy

- Significant differences in the discourse of the people with aphasia (as a whole group) from the healthy participants before therapy

- No significant differences in the discourse between the NARNIA participants and the Usual Care participants before therapy

# Everyday discourse pre-therapy

| Language level | Language measure | Controls (n=30) ($\bar{x}$) | All aphasia participants (n=14) ($\bar{x}$) | sig. |
|---|---|---|---|---|
| Overall output | No. utterances | 120.1 | 92.4 | ns |
| Word level | Heavy verbs | 99.5 | 44 | p<.001 ** |
| | Light verbs | 77.4 | 61.8 | ns |
| | Mental verbs | 16.3 | 6.9 | p=.002 ** |
| Sentence level | 2 arg structures | 38.3 | 36.1 | ns |
| | 3 arg structure | 17.1 | 11.9 | ns (p=0.6) |
| | Complex sentences | 40 | 21.3 | p=.001 ** |
| | Missing 1 arg | 7.9 | 17.4 | p=.014 ** |
| | Missing 2 args | 0.2 | 1.4 | p=.022 ** |

Independent t-tests

# Everyday discourse pre-therapy

| Language level | | Controls (n=30) $(\bar{x})$ | All aphasia participants (n=14) $(\bar{x})$ | sig. |
|---|---|---|---|---|
| Discourse | Orientation | 29.1 | 20.5 | p=.006 ** |
| | Body | 94.3 | 57.6 | p=.004 ** |
| | Conclusion | 32.8 | 17.1 | p=.038 ** |

Independent t-tests

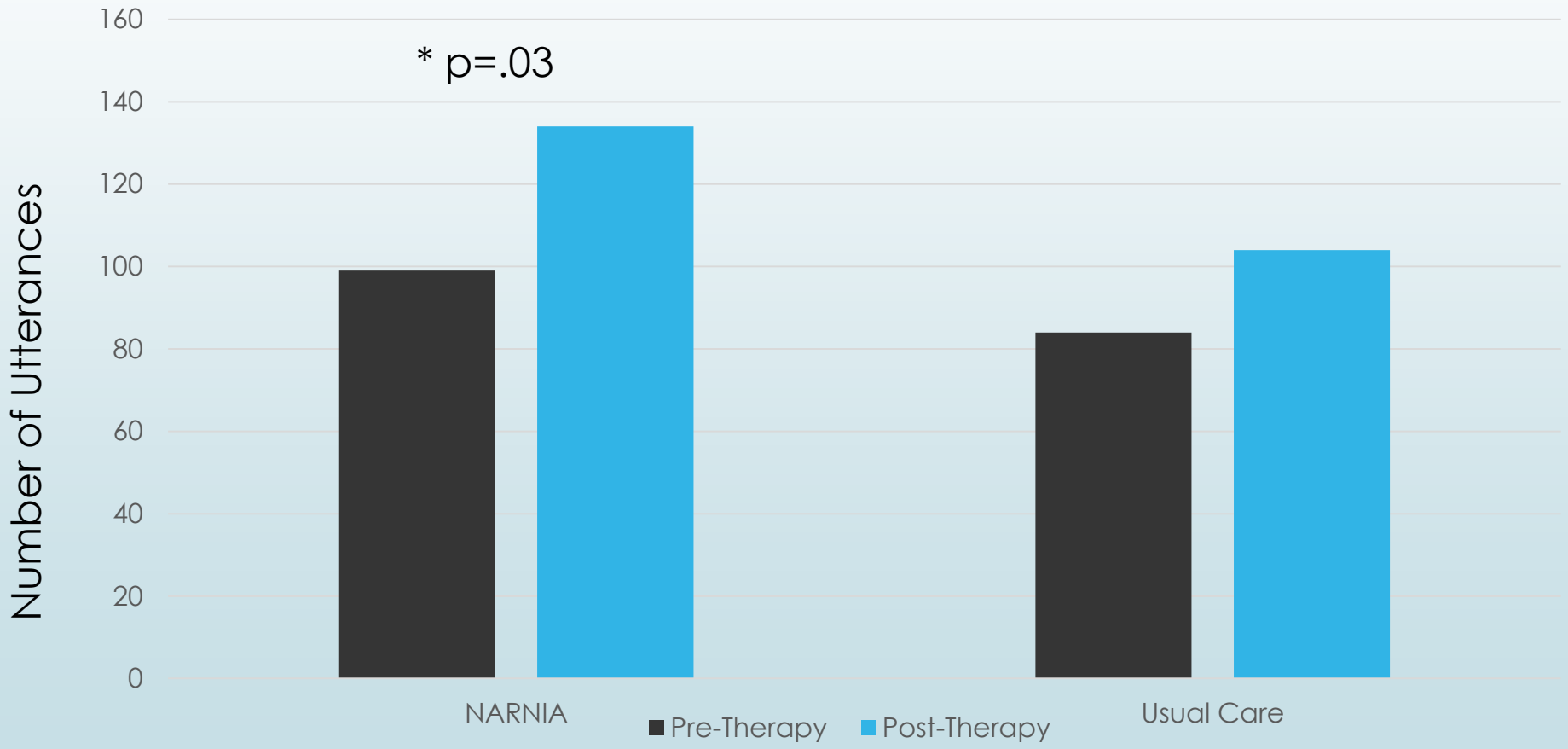
# Outcome of intervention: Constrained assessment

- **Some significant gains** on word level assessments

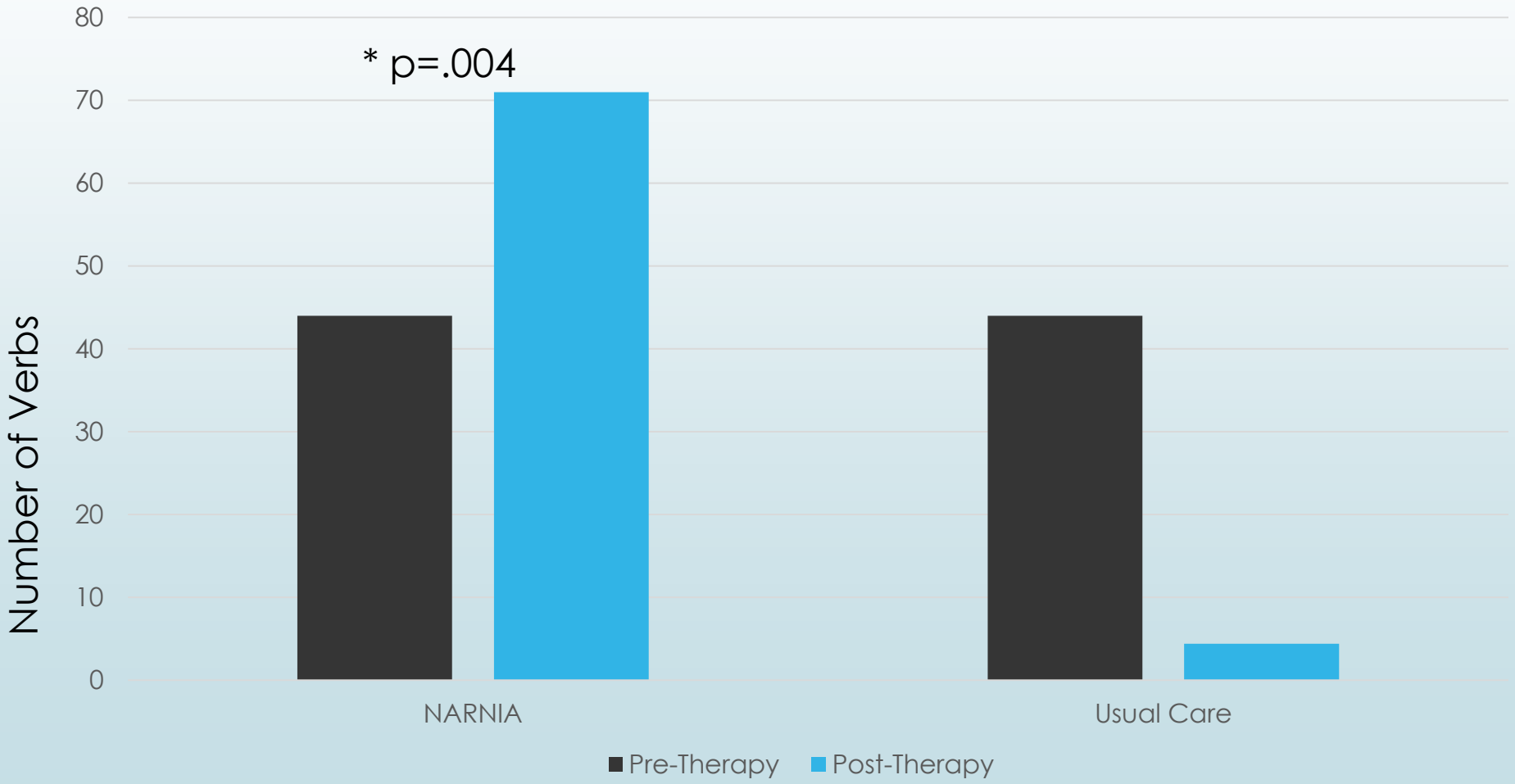
| Lang. measure | NARNIA | | Usual Care | |
|---|---|---|---|---|
| Verb comprehension | ✓ | p=.048* | ✗ | – |
| Verb naming | ✓ | p=.008* | ✗ | – |
| Noun naming | ✓ | p=.045* | ✓ | p=.002* |

- **No significant gains** on sentence level assessments

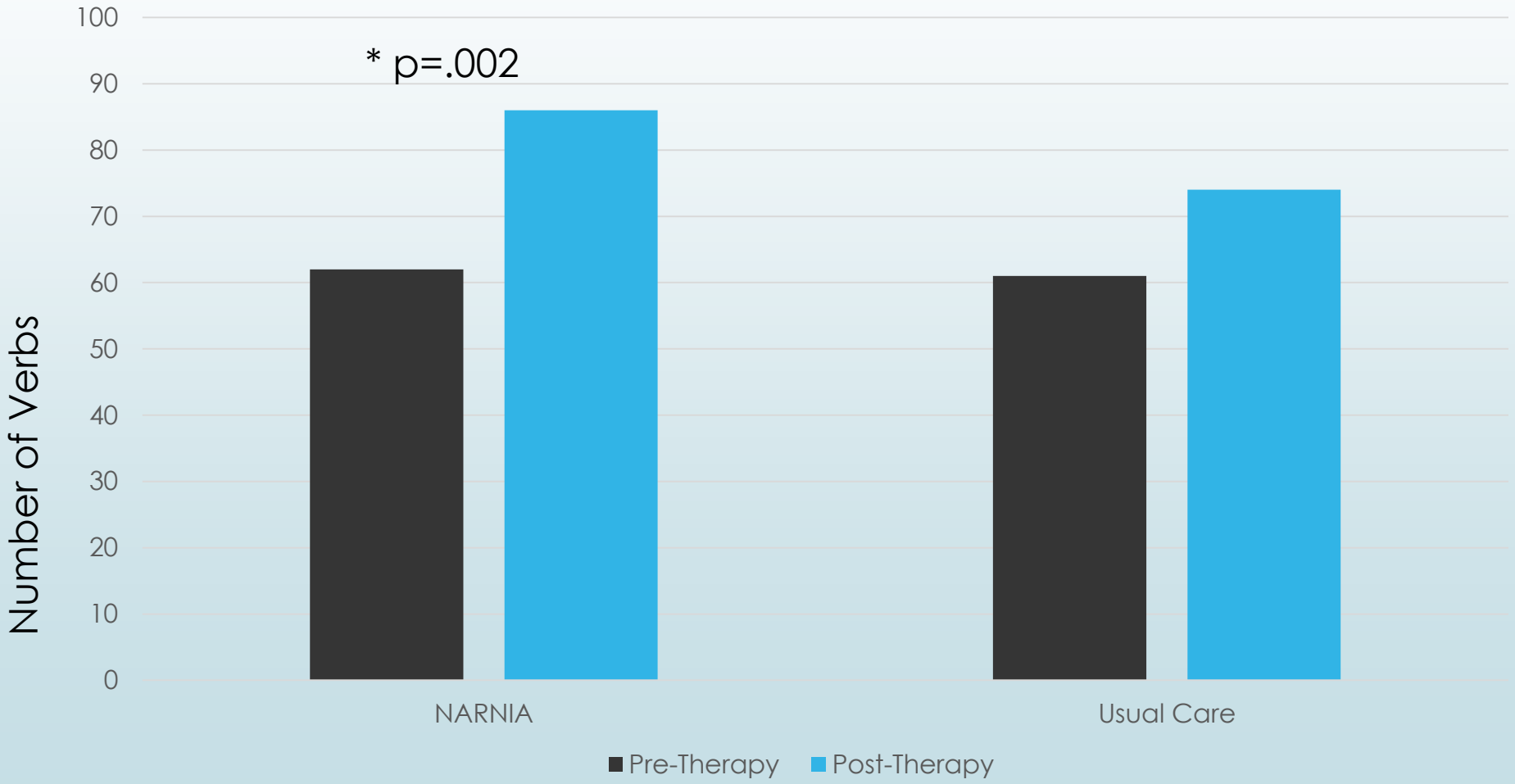
# Everyday discourse post therapy
# Overall output



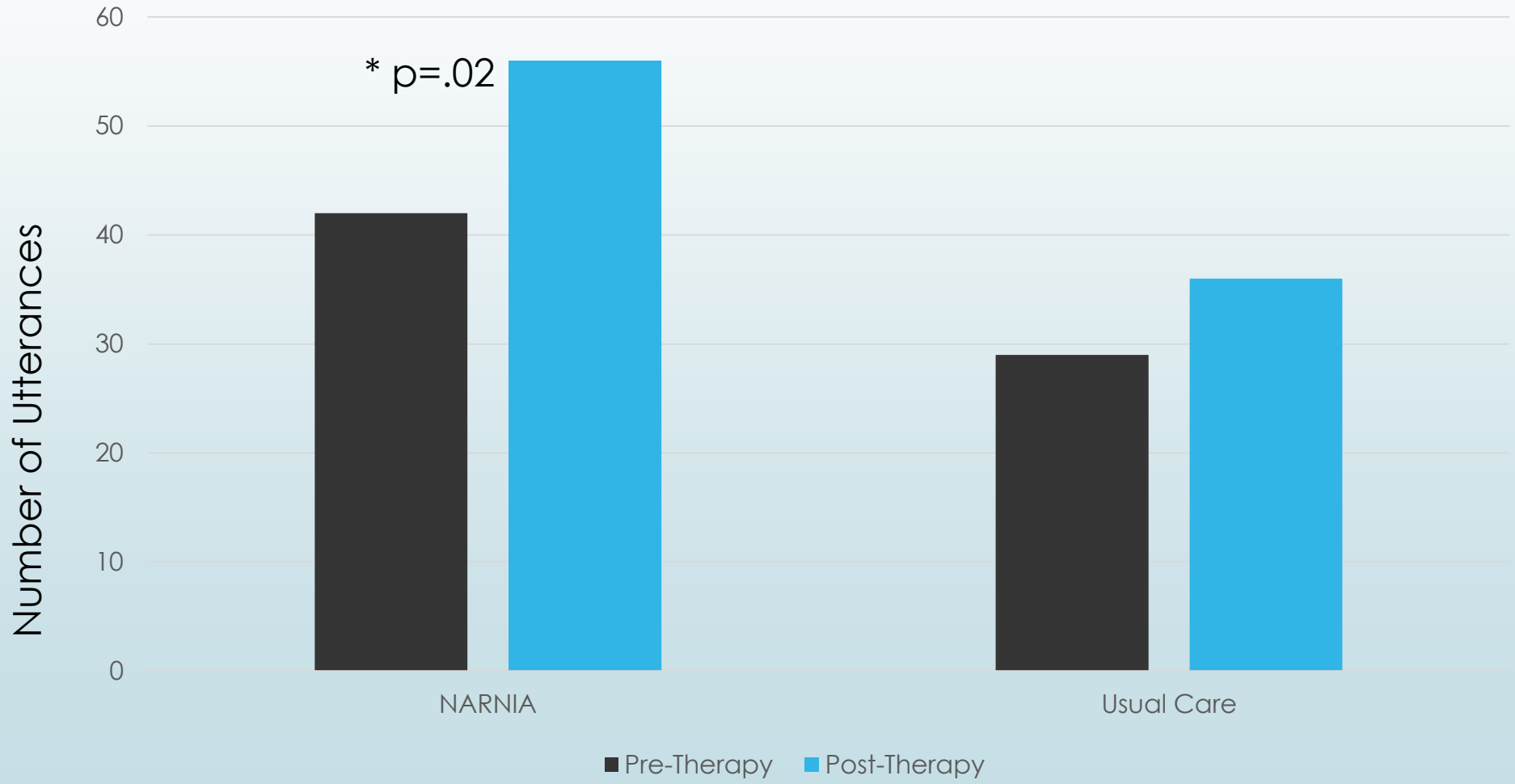
# Everyday discourse post therapy
# Lexical change: Heavy verbs



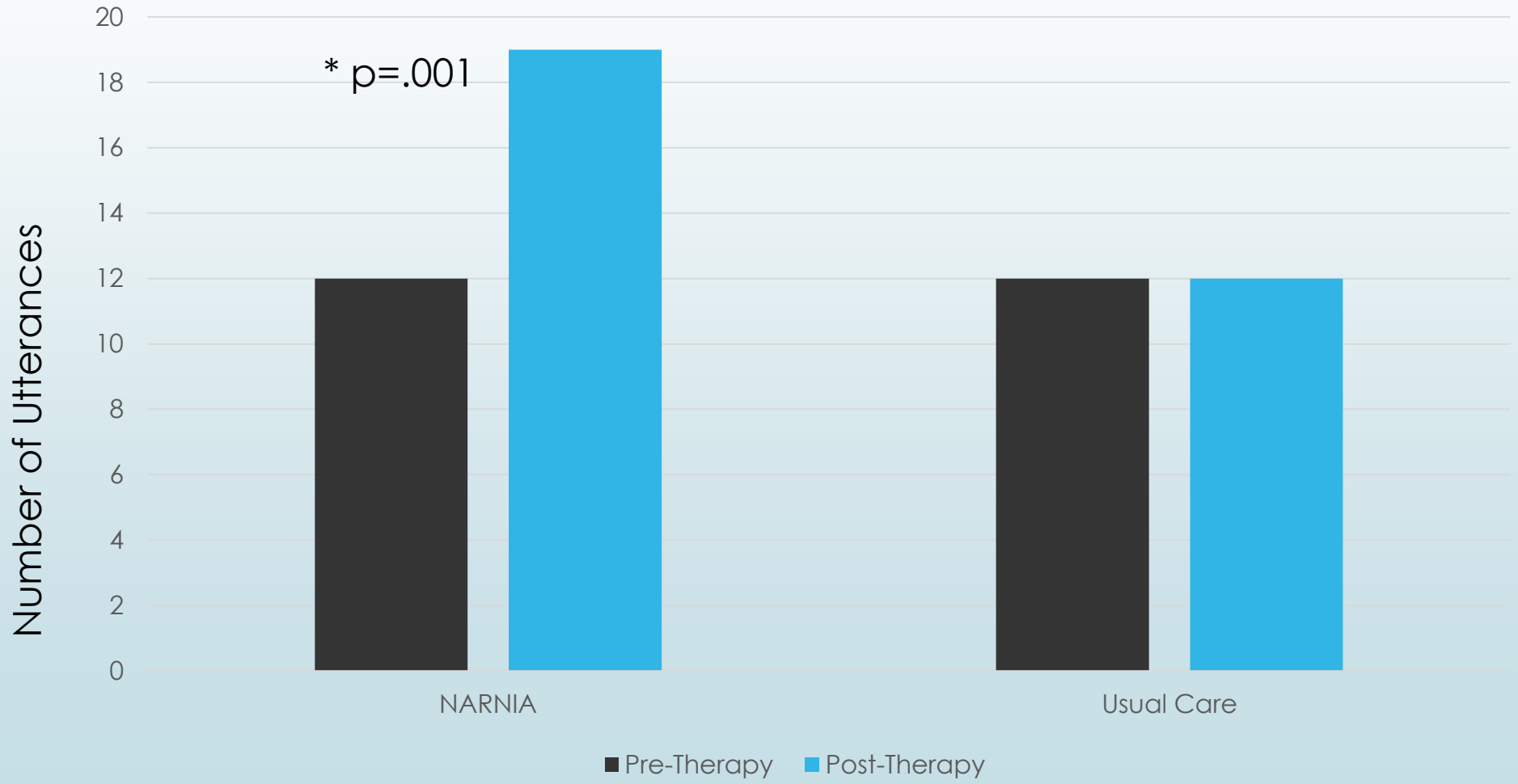
# Everyday discourse post therapy
# Lexical change: Light verbs



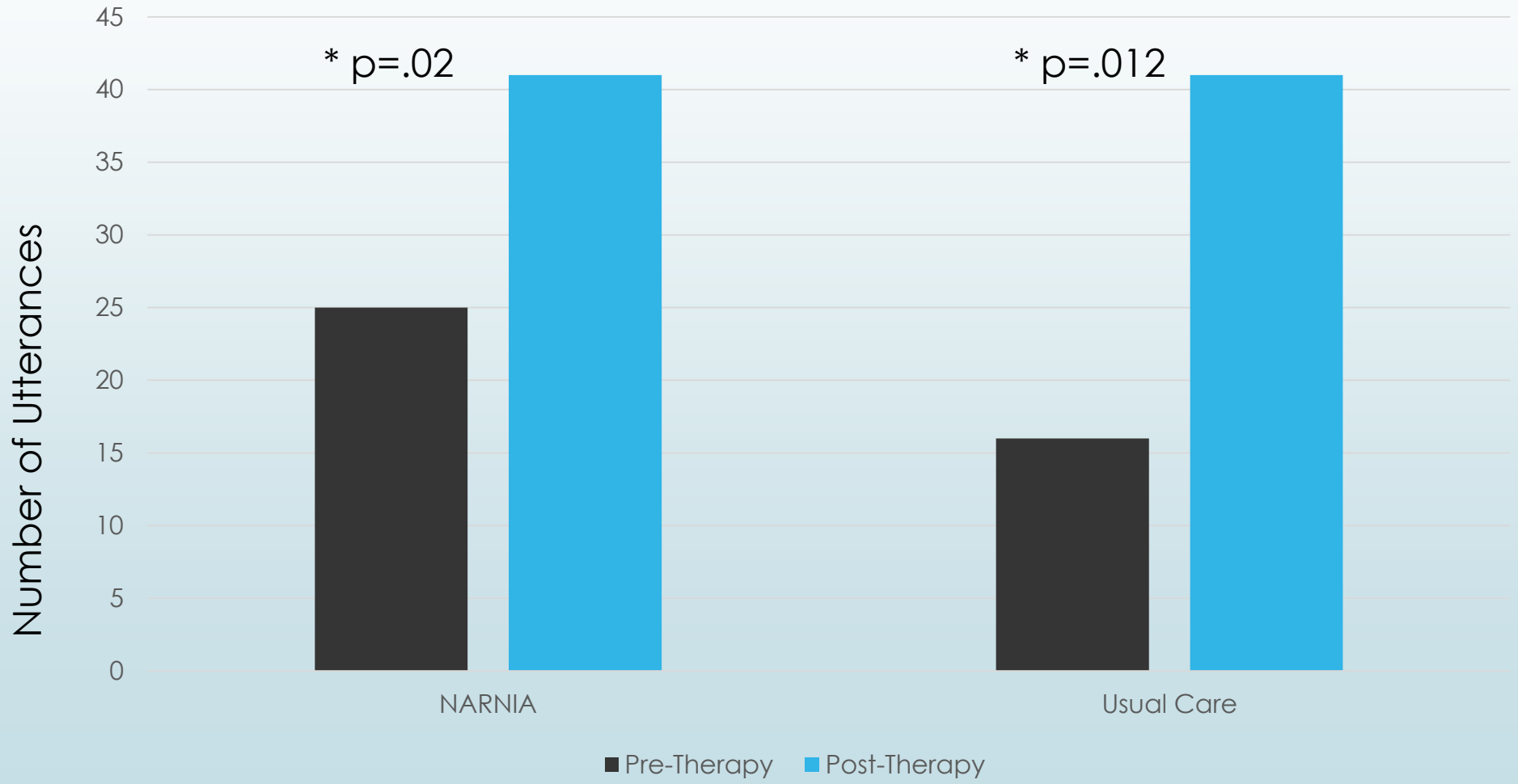
# Everyday discourse post therapy
# Structural change: 2 argument structures



# Everyday discourse post therapy
# Structural change: 3 argument structures



# Everyday discourse post therapy
# Structural change: Complex sentences



# Everyday discourse post therapy
# Discourse Structure

| Lang. measure | NARNIA | | | Usual Care | | |
|---|---|---|---|---|---|---|
| | PRE | POST | Sig. | PRE | POST | Sig. |
| **Orientation** | 19.8 | 25 | p=.03* | 21.5 | 16.8 | ns |
| **Body** | 59.2 | 89.1 | p=.03* | 55.5 | 68 | ns |
| **Conclusion** | 3.6 | 4.2 | ns | 3.3 | 3.6 | ns |

# Changes in Everyday Discourse Post-Therapy

| Level | Measure | NARNIA | Usual Care |
|---|---|---|---|
| Overall output | No. of utterances | ✓ | – |
| Word level | Heavy verbs | ✓ | – |
| | Light verbs | ✓ | – |
| Sentence level | 2 arg structures | ✓ | – |
| | 3 arg structures | ✓ | – |
| | Complex sentences | ✓ | ✓ |
| Discourse level | Orientation | ✓ | – |
| | Body | ✓ | – |
| | Conclusion | – | – |

# NARNIA: Multi-level therapy

- Multi-level therapy including a focus on word, sentence & discourse levels – very promising results
- Change in single word retrieval (potential generalisation to untreated words)
- Within discourse:
  - Change on lexical measures
  - Change in sentence production
  - Change in structure of discourse

# NARNIA – questions?

- What components of therapy are responsible for change?
  - Relative contribution of word retrieval (unconstrained vocabulary), focus on argument structure & focus on discourse
- What is the role of the discourse component?
  - Scaffold for word and sentence production
  - More naturalistic context for intervention

# Multi-level therapies: Word, sentence & discourse

**Carragher, Sage & Conroy (2015) - Exchange of new information within story-telling**

Therapy Approach - conveying information with short video clips

- For person with aphasia
  - Production of words and argument structure
  - Principles of story grammar to structure information
- For communication partner
  - Conversation coaching to develop strategies to check and clarify information

# Multi-level therapies: Word, sentence & discourse

**Carragher, Sage & Conroy (2015) - Exchange of new information within story-telling**

- Four participants with non-fluent aphasia

- Three participants showed generalisation to untrained stories
  - Improvements in communication of ideas
  - Changes in structure of simple narratives

- No straightforward relationship between changes in the ability of the person with aphasia to communicate ideas and the extent to which they were understood (by their communication partner)

# Multi-level therapies: Word, sentence & discourse

**Milman et al. (2014) Integrated Training for Aphasia**

- Therapy approach
- Within each session

**WORD** → **SENTENCE** → **DISCOURSE**

  - 20 mins of lexical retrieval of core vocabulary (food/activity)
  - 20 mins of sentence production training (simple sentences containing core vocabulary) e.g. 'I am watching TV' 'I am eating melon'
  - 10 mins of scripted dialogue training
  - 10 mins of generative conversation around related topic

- Group session

# Multi-level therapies: Word, sentence & discourse

**Milman et al. (2014) Integrated Training for Aphasia**

- 3 participants with non-fluent aphasia
- Gains on treated items (lexical retrieval and sentence production)
- No systematic generalisation to untreated items
- Gains in connected speech – both lexical and structural measures (although differed between participants)
- Only change for 1 participant on measure of 'communication' e.g. CETI

# Multi-level therapies: Word, sentence & discourse

- Outcome of multi-level therapies are promising
- Reasons for multi-level therapies (Milman et al. 2014)
  - Linguistic networks are extensive and inter-connected
  - Facilitate generalisation of treatment to everyday communicative interactions
  - Most individuals have multiple language impairments

'We may use multi-component and multi-level therapies to maximise the prospect of targeted and generalised change but we need to ensure we do not package everything up in a therapy without understanding what contributes to the improvement and whether all aspects are important and necessary.' (Whitworth & Webster, 2015)

Newcastle University

the tavistock aphasia centre north east

# Exploring the Role of Narrative in Measuring Outcome

# The Plan

## In the beginning….

- Background – sentence, narrative and discourse production
- Analysing narrative – role within assessment and diagnosis of sentence production difficulties
- Analysing discourse

## In the middle….

- What we know about language based intervention for word retrieval and sentence production
- Multi-level therapies: The NARNIA study

## In the end….


- **Comparing outcome measures**

# Introduction

**Webster, Whitworth & Morris (2015)**

- Maximise gains in everyday communication
- Reduce the disability associated with aphasia
- Increase participation

- Importance of monitoring the direct effects of therapy & generalisation
  - Linguistic change (including impact on connected speech)
  - Overall impact for person

See table 1 from Webster, J., Whitworth, A, & Morris, J. (2015) Is it time to stop 'fishing'? A review of generalisation following aphasia intervention. Aphasiology, 29, (11),1240-1264 .

| Level | Word | Sentence | Connected Speech | | |
|---|---|---|---|---|---|
| | | | Picture Description | Discourse | |
| | | | | Monologues | Dialogues |
| **Elicitation Methods** | • Picture naming<br>• Word association<br>• Naming to definition<br>• Sentence completion<br>• Word fluency | • Constrained phrase or sentence production tests | • Complex picture description<br>• Picture sequences | • Narrative, e.g. story retell<br>• Personal narrative, e.g. recount<br>• Procedural narrative<br>• Expositions, e.g. opinions | • Conversation (more or less naturalistic sampling)<br>• Role play |
| **Focus** | Lexical change | Lexical change<br><br>Structural change | Lexical change<br><br>Structural change<br><br>Informativeness | Lexical change<br><br>Structural change<br><br>Informativeness | Lexical change<br><br>Structural change<br><br>Informativeness<br><br>Change in interaction |

See Webster, J., Whitworth, A, & Morris, J. Is it time to stop 'fishing'? A review of generalisation following aphasia intervention. Aphasiology. ePub.

| Level | Word | Sentence | Connected Speech | | |
|---|---|---|---|---|---|
| | | | Picture Description | Discourse | |
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| **Elicitation Methods** | • Picture ne…<br>• W…<br>• W… | | Complex …re …n | • Narrative, e.g. story retell<br>• Personal narrative, e.g. recount<br>• Procedural narrative<br>• Expositions, e.g. opinions | • Conversation (more or less naturalistic sampling)<br>• Role play |
| **Focus** | **Lexical change** | **Lexical change**<br>Structural change | **Lexical change**<br>Structural change<br>Informativeness | **Lexical change**<br>Structural change<br>Informativeness | **Lexical change**<br>Structural change<br>Informativeness<br>Change in interaction |

Change in retrieval and production of treated and untreated words

See Webster, J., Whitworth, A, & Morris, J. Is it time to stop 'fishing'? A review of generalisation following aphasia intervention. Aphasiology. ePub.

| Level | Word | Sentence | Connected Speech | | |
|---|---|---|---|---|---|
| | | | Picture Description | Discourse | |
| | | | | Monologues | Dialogues |
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| **Focus** | Lexical change | Lexical change<br>**Structural change** | Lexical change<br>**Structural change**<br>Informativeness | Lexical change<br>**Structural change**<br>Informativeness | Lexical change<br>**Structural change**<br>Informativeness<br>Change in interaction |

Change in production of treated and untreated sentence structures or the overall structure of discourse

See Webster, J., Whitworth, A, & Morris, J. Is it time to stop 'fishing'? A review of generalisation following aphasia intervention. Aphasiology. ePub.

| Level | Word | Sentence | Connected Speech | | |
|---|---|---|---|---|---|
| | | | Picture Description | Discourse | |
| | | | | Monologues | Dialogues |
| **Elicitation Methods** | • Picture naming<br>• Word association<br>• Naming to definition<br>• Sentence completion<br>• Word fluency | • Constrained phrase or sentence production tests | • Complex picture description<br>• Picture sequences | • Narrative, e.g. story retell<br>• Personal narrative, e.g. | • Conversation (more or less naturalistic sampling)<br>• Role play |
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Change in ability to get the message across

See Webster, J., Whitworth, A, & Morris, J. Is it time to stop 'fishing'? A review of generalisation following aphasia intervention. Aphasiology. ePub.

# What should we measure and how?

- Need to consider:
  - Elicitation paradigm
  - Type of analysis
- Reliability of measure
- Clinical feasibility

# Analysing Discourse: Elicitation Paradigms

| Connected Speech | | |
|---|---|---|
| **Picture Description** | **Discourse** | |
| | **Monologues** | **Dialogues** |
| • Complex picture description<br>• Picture sequences | • Narrative, e.g. story retell<br>• Personal narrative, e.g. recount<br>• Procedural narrative<br>• Expositions, e.g. opinions | • Conversation (more or less naturalistic sampling)<br>• Role play |

# Conversation

- Conversation is frequently considered to be the gold standard in demonstrating the generalisation of treatment effects following aphasia therapy. (Carragher, Conroy, Sage, & Wilkinson, 2012; Lind, Kristoffersen, Moen, & Simonsen, 2009)

- And yet we know that conversation is characterised by…
  - its interactional nature and the presence of the conversation partners
  - variability  in terms of structure and organisation (or lack of) – topic, conversation partner
  - reduced syntactic complexity and length of utterance when compared to other monologic discourse.

# Relationship between elicitation conditions

**Conroy, Sage & Lambon Ralph (2009)**

- Explored effects of naming therapy for nouns & verb – single picture naming, picture-supported narrative & unsupported retell of narrative

- Step-wise reduction in naming accuracy as the elicitation method became more complex

  Picture naming > Picture supported narrative > Narrative re-tell

- Tasks differ in:
  - Linguistic complexity
  - Cognitive complexity

# Relationship between elicitation conditions

**Whitworth et al. (2015) - NARNIA study**

- Relationship between everyday discourse (recount, procedure, exposition) and narrative

- Some differences in the patterns seen pre-therapy (when compared to normal control participants)

# Changes in Everyday Discourse Post-Therapy

| Level | Measure | NARNIA | Usual Care |
|---|---|---|---|
| Overall output | No. of utterances | ✓ | – |
| Word level | Heavy verbs | ✓ | – |
| | Light verbs | ✓ | – |
| Sentence level | 2 arg structures | ✓ | – |
| | 3 arg structures | ✓ | – |
| | Complex sentences | ✓ | ✓ |
| Discourse level | Orientation | ✓ | – |
| | Body | ✓ | – |
| | Conclusion | – | – |

# Changes in Narrative Discourse Post-Therapy

| Level | Measure | NARNIA | Usual Care |
|---|---|---|---|
| Overall output | No. of utterances | – | – |
| Word level | Heavy verbs | – | – |
| | Light verbs | – | – |
| Sentence level | 2 arg structures | – | – |
| | 3 arg structures | – | – |
| | Complex sentences | ✓ | ✓ |
| Discourse level | Orientation | – | – |
| | Body | – | – |
| | Conclusion | – | ✓ |

# Relationship between elicitation conditions

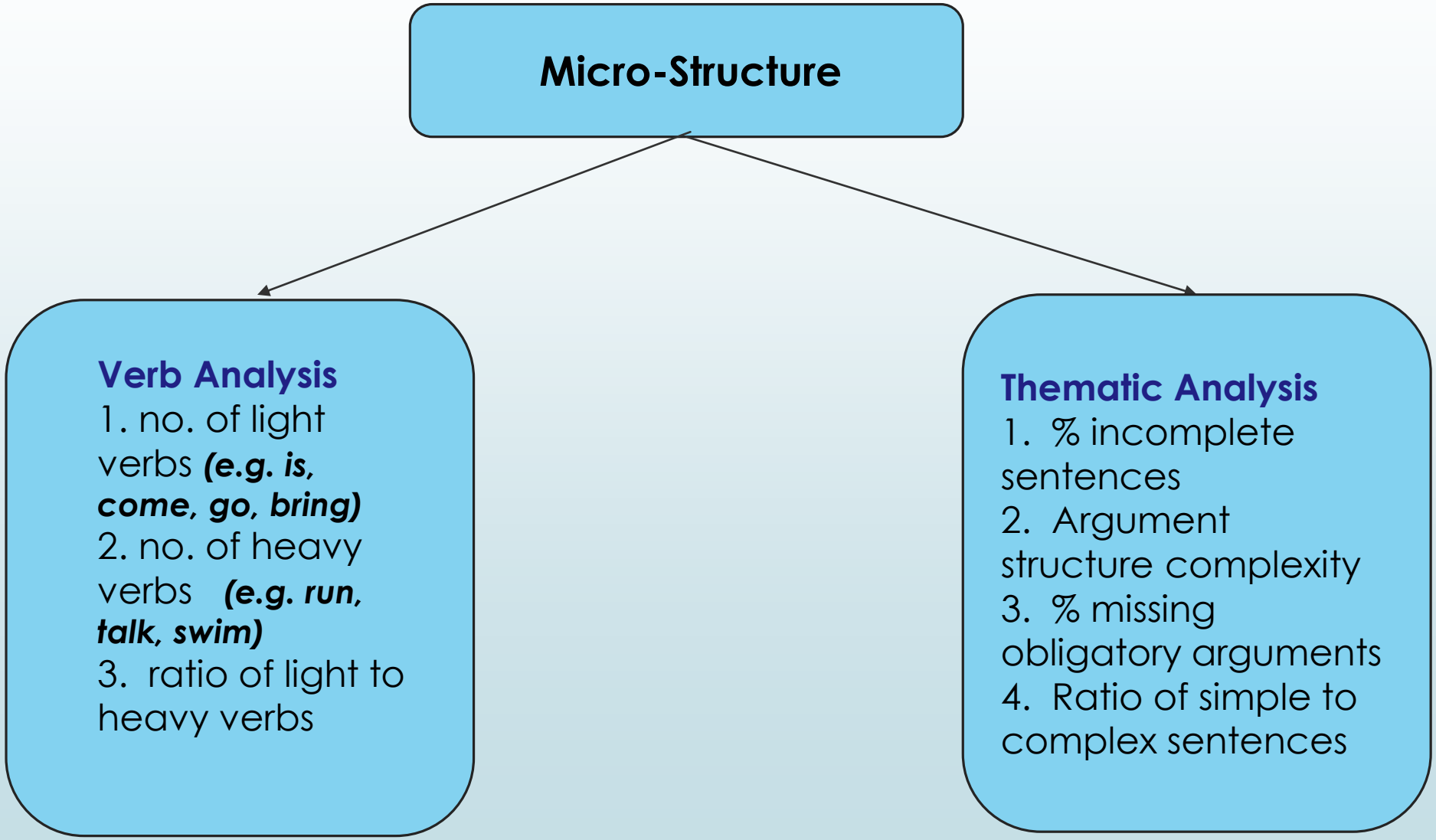
**Whitworth et al. (2015) - NARNIA study**

- Relationship between everyday discourse (recount, procedure, exposition) and narrative
- Marked differences between changes seen in everyday discourse and changes seen in narrative
- Possible explanations:
  - Individual variation in production
  - NARNIA protocol – only focused on picture supported narrative at early stage of programme
  - Cinderella – cultural relevance, familiarity with story
- Narrative production may not be useful outcome measure for this type of intervention

# Relationship between elicitation conditions

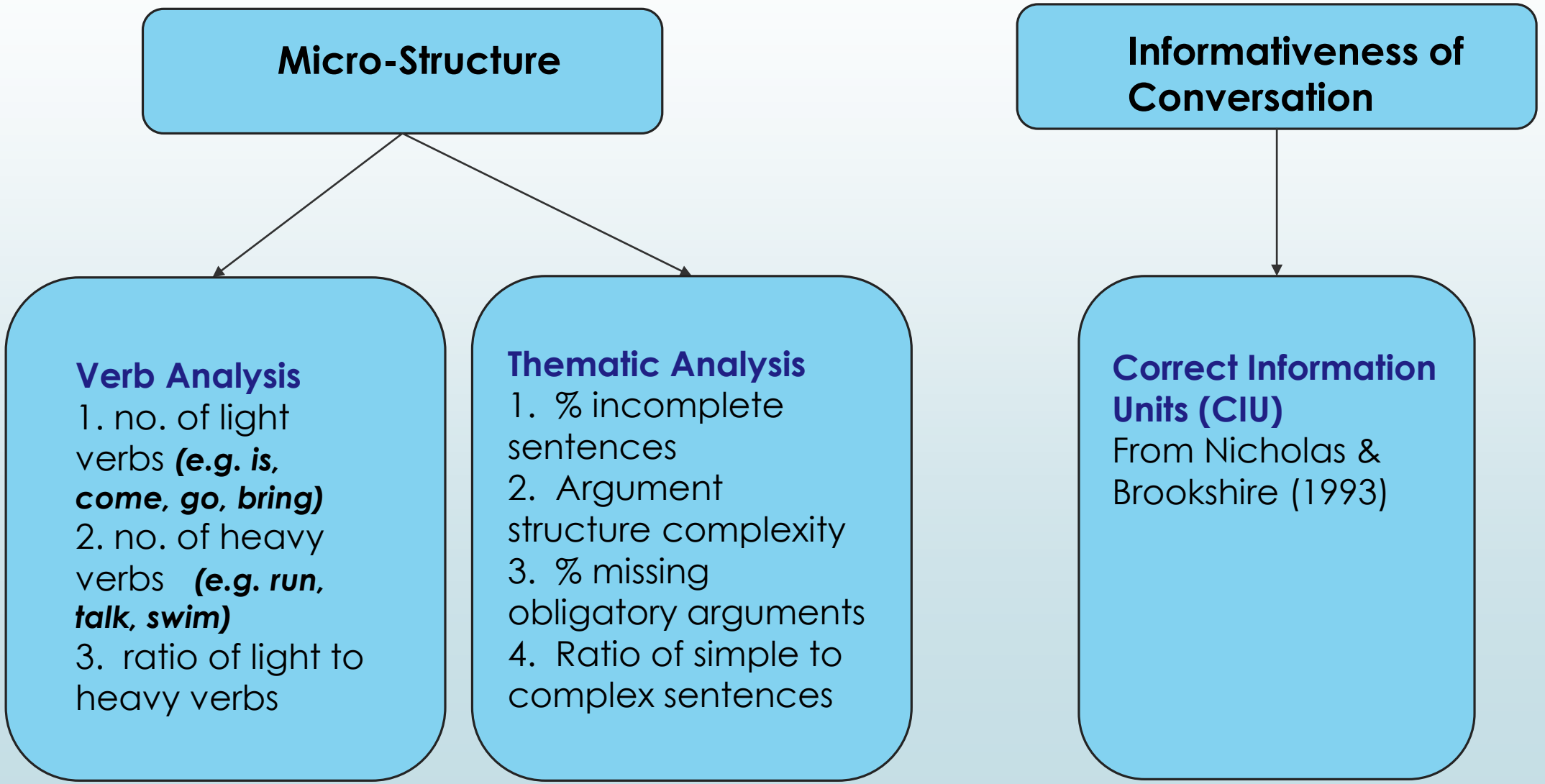
**Further examination of the changes seen post-NARNIA Therapy**

- Relationship between everyday discourse (recount, procedure, exposition) and conversation
- Eight participants within NARNIA group


Micro-Structure
Verb Analysis
1. no. of light verbs (e.g. is, come, go, bring)
2. no. of heavy verbs (e.g. run, talk, swim)
3. ratio of light to heavy verbs
Thematic Analysis
1. % incomplete sentences
2. Argument structure complexity
3. % missing obligatory arguments
4. Ratio of simple to complex sentences

# Changes Post-Therapy

| Level | Measure | Everyday Discourse | Conversation |
|---|---|---|---|
| Overall output | No. of utterances | ✓ | - |
| Word level | Heavy verbs | ✓ | - |
| | Light verbs | ✓ | - |
| Sentence level | No. of UTS utterances | ✓ | ✓ |
| | 2 arg structures | ✓ | - |
| | 3 arg structures | ✓ | - |
| | Complex sentences | ✓ | ✓ |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3. ratio of light to heavy verbs
Thematic Analysis
1. % incomplete sentences
2. Argument structure complexity
3. % missing obligatory arguments
4. Ratio of simple to complex sentences
Informativeness of Conversation
Correct Information Units (CIU)
From Nicholas & Brookshire (1993)

# Changes Post-Therapy

- There was NO main effect of treatment on informativeness of conversational speech

  $F(2, 12) = 0.96, p > .05$

**Table F1**

**Results of Fisher's Exact Test for %CIU across treatment periods**

| Participants | Pre | Post | Significance | Post | 5-weeks Post | Significance |
|---|---|---|---|---|---|---|
| 001 | 80.66 | 80.50 | p= .53 | 80.50 | 77.30 | p = .43 |
| 003 | 64.34 | 63.57 | p= .51 | 63.57 | 70.83 | p = .29 |
| 004 | 76.60 | 83.50 | P= .32 | 83.50 | 82.39 | p = .50 |
| 006 | 75.81 | 86.21 | p= .23 | 86.21 | 86.39 | p = .52 |
| 007 | 77.38 | 74.81 | p= .45 | 74.81 | N/A | N/A |
| 010 | 81.40 | 83.76 | p= .46 | 83.76 | 83.46 | p = .52 |
| 013 | 59.46 | 64.71 | p= .35 | 64.71 | 46.15 | p < .05 |
| 014 | 81.97 | 83.33 | p= .49 | 83.33 | 85.52 | p = .47 |

Results of Fisher's Exact Test for %CIU across treatment periods

# Relationship between elicitation conditions

**Further examination of the changes seen post-NARNIA Therapy**

- No parallel gains in conversation in participants who had made robust improvements in everyday discourse

- With the exception of a significant reduction in single phrases, the gains seen at the word and sentence levels did not generalise to conversation.

- No change seen in the informative measure used across the conversation samples.

# Conclusions

- Whilst changes in conversation may be the desired treatment aim – can be difficult to show robust gains post-therapy

- Need to understand the relationship between different elicitation conditions, discourse genres and conversation

# Overall Conclusions

Narrative (and discourse more broadly)

- Useful in description of spontaneous speech of people with aphasia
- Useful in diagnosis of underlying sentence production difficulties
- Useful within intervention – as scaffold or as context for intervention
- Important to consider when monitoring treatment effects and generalisation

# Thanks for listening

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