

Research Article

Investigating Adolescent Discourse in Critical Thinking: Monologic Responses to Stories Containing a Moral Dilemma

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Purpose: The adolescent developmental task of establishing autonomy from parents is supported through various aspects of executive functioning, including critical thinking. Our aim was to investigate younger and older adolescent language performance in form, content, and use in response to a moral dilemma task.

Method: Forty-four typically developing adolescents completed a language sampling task, responding to stories that contained a moral dilemma for one of the characters. Two age groups participated: younger adolescents ($n = 24$, 12;2–13;11 [years; months]) and older adolescents ($n = 20$, 16;1–17;11). Participants produced a monologue in response to an open-ended question prompt. Responses were transcribed and analyzed for discourse production on measures of form (verbal productivity and syntactic complexity) and content (semantic diversity and word percentages in three semantic domains: affective, social, and cognitive). Language use was evaluated using a coding system based on Bloom's revised taxonomy of thinking.

Results: There were no significant group differences in performance on measures of syntactic complexity and semantic diversity. Significant differences were found in adolescents' language using Bloom's revised taxonomy. The younger adolescents demonstrated a significantly higher proportion of utterances at Level 1 (remembering and understanding) compared to older adolescents, while the older age group produced a higher proportion at Level 3 (evaluating and creating).

Conclusions: The moral dilemma task was effective in demonstrating the growth of adolescent language skills in use of language for critical thinking. The results highlight the clinical utility of the moral dilemma task in engaging adolescents in discourse involving critical thinking, whereas the associated coding scheme, based on Bloom's revised taxonomy of thinking, may differentiate levels of critical thinking and provide direction for intervention.

The central feature of adolescence is transition and transformation, defined by physiological, neurological, psychological, and social developmental changes (Weisz & Hawley, 2002). The development of formal operational thought (Inhelder & Piaget, 1958) is said to support the emergence of autonomy in the adolescent, as individuals demonstrate their growing ability to make independent

decisions and analyze and reflect on their beliefs in order to establish their own values and morals (Erikson, 1968). The shift from a state of cognitive, emotional, and behavioral dependence on parents to greater personal independence culminates in two critical developmental tasks: (a) establishing a personal identity and (b) separation-individuation from the parent-child relationship (Alonso-Stuyck et al., 2017; Jones et al., 2014). One aspect of this evolving independence is the emergence and growing awareness of morality, whereby judgments of action and motivation are guided by principles such as justice and equality (Leung & Shek, 2018). The adolescent's moral maturation is reflected in the progression from early to late adolescence toward a more socially oriented perspective, focusing less on self and taking greater interest in outcomes that value the "greater good" (Morris et al., 2011).

Critical thinking skills play an important role in the process of moral development, as adolescents analyze, evaluate, and synthesize information gathered from their

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interactions with others. These skills are used to argue, justify, and reflect on their own personal opinions and motivations, impacting on their sense of decision-making responsibilities (Weinstock et al., 2009). However, while there is recognition of the importance of critical thinking skills in moral development and learning (Paul, 1993), investigation into the “language skills” required to competently express one’s thinking and reasoning has received limited attention. In fact, the few studies that have focused on language and critical thinking have narrowed their lens of investigation to report specifically on syntactic aspects (Nippold et al., 2014, 2015). To address this gap in knowledge, we employed a cross-sectional study design to investigate the language used in critical thinking through adolescents’ responses on a task of moral reasoning, an important skill in the development of autonomy. We start by providing an overview of critical thinking as it is represented in education curricula and how growth in critical thinking skills during adolescence supports the development of autonomy. We then highlight how language skills underpin the development of critical thinking.

Critical Thinking and Autonomy

Critical thinking has been defined as “purposeful, self-regulatory judgment, which results in interpretations, analysis, evaluation and inference” (Facione, 1990, p. 2). It has been given a strong focus in higher education as it is considered essential for achieving academic success (Stupple et al., 2017). In the U.S. education curriculum, critical thinking is embedded in the Common Core State Standards through the Speaking and Listening Standards. For example, a Year 8 standard states: “Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details.” (CCSS.ELA-Literacy.SL.8.4). In comparison, the Australian Curriculum establishes critical and creative thinking as one of seven general capabilities necessary “in equipping young Australians to live and work successfully in the twenty-first century” (Australian Curriculum Assessment and Reporting Authority [ACARA], 2012). The critical and creative thinking capability is characterized by processes of analyzing and evaluating, inquiring, generating ideas and possibilities, and reflecting on the thinking process.

Growth in critical thinking skills also plays an important role in the adolescent’s emerging autonomy. Autonomy is more than simply acting independently, as it includes independently thinking, reflecting, and making moral decisions (Steinberg & Silverberg, 1986). Through systematic introspection, adolescents develop and refine their personal moral belief systems, thinking more deeply about complex issues, such as those that highlight moral dilemmas (Morris et al., 2011). In the course of this process, the adolescent decides whether to agree or disagree with the expressed views, values, or beliefs of parents and peers (Paul, 1993; Van Petegem et al., 2013). Such decisions are at the heart of the developmental task of becoming autonomous (Steinberg & Silverberg, 1986; Trucco et al., 2020). A recent meta-analysis of 310 longitudinal studies revealed a bidirectional association between low

success in the attainment of eight developmental tasks, such as developing a personal identity and a value system, and the presence of psychological symptoms, including internalizing or externalizing symptoms, anxiety, and depression (Pinquart & Pfeiffer, 2020). Interventions such as cognitive therapies are reliant on shared conversation and the language of reasoning and critical thinking, yet our understanding of the contribution made by language is limited (Wenzel et al., 2016). Understanding how the cognitive and language processes underlying these developmental tasks work together could provide a stronger basis for intervention programs with adolescents who face difficulties in self-determination, planning and goal setting, motivation, problem solving, and resilience (Koepke & Denissen, 2012; Zimmer-Gembeck & Collins, 2006).

Language Development in Adolescence

Adolescence is a time of subtle but definite developmental advancement of oral language skills across syntax, semantics, and pragmatics (Joffe et al., 2019; Nippold, 2014, 2016). In order to engage effectively with peers and others in real-world contexts, adolescents need to develop increasing competency in a range of discourse types, for example, conversation, narration, exposition, and persuasion (Heilmann et al., 2020; Snow & Powell, 2008; Westerveld & Moran, 2011), with a growing emphasis on peer interactions over family (Wadman et al., 2011). From social exchanges between friends to the higher level language skills required to reason and debate academic topics, adolescents use their growing command of language to confidently engage with the world around them.

In adolescence, syntactic development is characterized by longer and more grammatically complex sentences with greater use of dependent clauses (clausal density; Heilmann & Malone, 2014; Nippold, 2016). Nippold (2016) argued that the development in syntactic complexity, especially through the increased use of subordinate clauses, enables adolescents to express more complex ideas with efficiency. It also reflects the interplay between cognitive and language processes in the adolescent years that supports further growth in critical thinking. Semantically, adolescent language grows to encompass more literate language, including the use and understanding of mental state verbs, abstract nouns, and adverbial conjunctions (Nippold et al., 2017; Sun & Nippold, 2012). The increasing command of mental state verbs or metacognitive verbs (such as believe, realize, remember) allows the adolescent to describe and reflect on another’s thoughts and viewpoint. This category of words represents a salient feature of critical thinking and autonomy (Fuste-Herrmann et al., 2006; Nippold et al., 2017). Throughout the high school years, language skills also develop to meet the demands of the school curriculum. Vocabulary expands to encompass more abstract and complex concepts relating to curricular subjects and complex syntax used in texts must be processed with transfer of skills into adolescents’ own writing. Moreover, adolescents’ language competence is broadened and challenged by the need to master a range

of academic discourse genres, such as debating, persuading, reasoning, and critical thinking (Conti-Ramsden & Durkin, 2012; Joffe et al., 2019).

Results from investigations directed at exploring age-related differences in language skills have, however, been mixed. Some researchers have noted significant differences between younger and older adolescents (YA and OA, respectively) in grammar and vocabulary (Heilmann et al., 2020; Nippold et al., 2020). Others, although reporting a trend toward more complex grammar and growth in vocabulary, have not found these differences to be statistically significant (Hill et al., 2020; Westerveld & Malone, 2013). Clarification in this matter is important, especially in relation to the assessment and planning of interventions for adolescents with language and learning difficulties. The variability in findings also highlights the need for assessment tools that are sensitive to subtle but clinically and educationally important developmental changes in language that may be occurring during adolescence.

Language Assessment

Language sampling and analysis provides a detailed picture of oral discourse and is ideal for studying complex language in form, content, and use (Bloom & Lahey, 1978). Previous studies have investigated adolescent language in discourse genres, including conversation (Lord Larson & McKinley, 1998; Wetherell et al., 2007), personal recount (McCabe et al., 2008; Westby & Culatta, 2016), and fictional narratives (Reed et al., 2007). Other oral discourse genres have received less attention, such as producing explanations (Berman & Verhoeven, 2002; Moran et al., 2012; Westerveld & Moran, 2013) and providing persuasive arguments (Heilmann et al., 2020).

Through a series of investigations, Nippold et al. (2014, 2015, 2017) have investigated complex language in critical thinking by studying adolescents' performance on a story retelling task that used fables and answering related questions. Both tasks resulted in more syntactically complex language than language samples elicited in general conversation. However, while fable retell and critical thinking questions successfully elicit complex language, Nippold et al. (2014) noted that using a fable retell task preempts complex syntax by virtue of the fact that the fables are told in a literate language style. A key difference between a retell task and a generative task lies in the availability of the language form and content. A retell task primes individuals to the form and content of the discourse by providing a linguistic model and critical vocabulary. In a generative elicitation task, individuals draw upon their own internal knowledge and language ability to access their lexicon and construct sentences, and Nippold et al. (2015) reasoned that the use of fables and associated critical thinking questions aligns with tasks that target critical thinking in the secondary school curriculum. However, as a sampling method of discourse, the fable-retelling task fails to capture the spontaneity of natural communication. Adolescents are not challenged to consider and verbally express their own personal opinions

or values in a spontaneous or extended manner. These are important features of critical thinking, fundamental in the developmental shift toward autonomy.

Studies investigating language performance in critical thinking have focused predominantly on "language form" through performance measures of verbal productivity (number of utterances) and syntactic complexity (mean length of utterance, clausal density). In relation to "language content," studies have looked at the frequency of mental state verbs (Nippold et al., 2017). However, an individual's choice of words in their written or oral discourse reveals explicitly where their attention is directed (Groom & Pennebaker, 2002). In highlighting mental state verbs, researchers have presumed that, in a discourse task examining critical thinking, adolescents would focus their attention on the cognitive domain. Emotional and social domains, however, are also playing a crucial role in critical thinking, especially when considered through the developmental lens of establishing autonomy and a personal identity (Morris et al., 2011). As adolescents navigate the challenges associated with these developmental tasks, relationships with peers become increasingly important (Wadman et al., 2011). Connecting with others through skills and behaviors such as sharing emotional experiences, empathy, interpersonal negotiation, and social problem solving are underpinned by developments in language and cognition, yet the research has not focused on these domains.

"Language use" is equally worthy of investigation but has been largely neglected in the literature. In a recent study, Nippold et al. (2020) have begun to address this gap by examining critical thinking in the written language samples of adolescents in two age groups. A 4-point scoring system was developed to evaluate written responses, explaining why participants agreed or disagreed with the moral message expressed in four fables. Nippold et al. found that the older age group outperformed the younger group by providing responses that were more detailed and elaborated. In effect, Nippold et al. were able to cast light on how critical thinking develops through studying how the language was used in this task.

This Study

Critical thinking entails an in-depth understanding of facts, requiring adolescents to synthesize, analyze, evaluate, and integrate information. As a cognitive skill, it is highly valued and nurtured in educational curricula. Developmentally, it is an essential element in the adolescent's move toward autonomy and successful individuation from parents. Language plays an important role in underpinning critical thinking through form, content, and use (Bloom & Lahey, 1978). In this study, we investigated the discourse production of YA and OA in a critical thinking task that required a monologic response to stories containing a moral dilemma. In Kohlberg's (1976) stages of moral development, adolescence aligns with the conventional level of moral reasoning, where actions are judged in relation to societal expectations. The conventional level in Kohlberg's stages of moral

development is characterized by a progression in reasoning from Stage 3 (early adolescence) to Stage 4 (late adolescence into adulthood). We were interested in whether adolescents' monologic responses after listening to two stories that contained a moral dilemma would provide further insight into the language skills that support critical thinking.

The following research questions were asked:

1. How do YA and OA perform on language measures of form (verbal productivity and syntactic complexity) and content (semantic diversity and word percentages in three semantic domains: affective, social, and cognitive) in a monologic response to a moral dilemma discourse task?
2. Are there group differences in performance in the use of language to support critical thinking on the moral dilemma discourse task?
3. What patterns of association exist between adolescent spoken language skills in form and content and their use of language for critical thinking in response to the moral dilemma discourse task?

We did not expect significant differences in language form between the two groups (Hill et al., 2020); however, as we have used a new task, language form was examined in supplementary analyses for exploratory purposes. Similarly, in language content, we considered that the two groups would be similar, although a difference was hypothesized for the cognitive domain. In relation to the use of language, we hypothesized that OA would produce a larger proportion of utterances at a higher level of critical thinking (Nippold et al., 2020).

Method

Participants

Forty-four typically developing adolescents from two age groups consented to participate in the study: 24 YA ($M = 157.42$ months, range: 12;2–13;11 [years;months]) and 20 OA ($M = 206.3$ months, range: 16;1–17;11). In Australia, children transition into secondary school around 12 years and exit at around 17 years; hence, the two groups represented two key points of secondary schooling. Adolescents were recruited through the professional and personal networks of the first author and resided in a large metropolitan Australian city. Parents were briefly questioned to ensure all participants met the inclusion criteria: (a) spoke English as their first language; (b) no known history of hearing difficulties, neurological disorders, or speech-language problems requiring intervention; and (c) performing within grade expectations at school. Participants were considered to be performing within grade expectations if academic achievement results for Math and English in the previous 12 months fell in the range from A (a rating assigned to very high achievement) to C (a rating consistent with average achievement).

Procedure

The study was approved by Queensland Health, Human Rights and Ethics Committee (HREC/14/QRCH/344) and Griffith University (HREC2016/813). Parents and adolescents signed forms consenting to the adolescents' participation in the study, and a movie voucher was given to all adolescents to thank them for their participation.

The examiner (first author) was a certified practicing speech pathologist, experienced in working with adolescents. All adolescents were assessed individually in a quiet environment, either at school or at home, in a single session of 40- to 50-min duration. All sessions were recorded using a digital voice recorder. After an initial brief conversation to establish rapport, participants were asked to complete a selection of spoken language assessments, with the moral dilemma task being last in the protocol. Participants were asked to provide a monologic response to two stories (administered in the same order each time), which presented a moral dilemma for one of the characters. No preparatory time was allowed for participants to compose their ideas, and no structure was provided as a prompt.

Materials

The moral dilemma task was based on the stories used in Kohlberg's (1976) research into moral development. Kohlberg employed the task of reflecting on and responding to a series of short stories, where one of the main characters is presented with a moral dilemma. Two stories were chosen and slightly modified for a present-day reality (e.g., names were anglicized from Heinz to Simon; the cost of a music concert was raised from \$20 to \$100). The two scripts were analyzed using Microsoft Word, which reported a grade level of 7.2 and 7.3 for each passage, based on the Flesch–Kincaid readability measure (Microsoft Word, 2016). Each story was presented to the participant on an iPad, so that participants could read along. At the end, the iPad was left in front of the participant. Participants were invited to share their thoughts on what each story made them think about. The two stories and administration protocol for the moral dilemma discourse task is provided in Appendix A.

Transcription and Coding

The language samples were digitally recorded and later transcribed verbatim by an independent research assistant using the standard transcription conventions of Systematic Analysis of Language Transcripts, New Zealand Version (SALT-NZ; Miller et al., 2015). Participants' responses were segmented into communication units (C-units), defined as a main clause with all its dependent clauses (Loban, 1976). Sentence fragments were counted as individual utterances where a complete proposition was indicated by intonation and content. After the samples were transcribed, the first author checked all transcriptions for accuracy and segmentation, listening to original sound files in cases of unintelligible speech or to resolve segmentation issues and making corrections when required. The first

author then proceeded to code each C-unit for the level of critical thinking based on the coding scheme described below. A second research assistant, a PhD student in psychology and also experienced in SALT transcription, was provided 15% of the total number of language samples based on a random selection as written transcriptions and the corresponding sound files. The research assistant checked transcriptions for accuracy in words and segmentation of utterances. This yielded 98% agreement for segmentation of utterances and 99.0% for word agreement (range: 97.5%–99.8% per transcript). The second author was then trained in the application of the coding scheme using eight of the transcripts. The researcher considered each utterance and applied a code to the level of thinking. The two researchers then checked for agreement, resolving disagreements by discussion. After the training set, the second author then independently coded a further 15% of the transcripts, consisting of 204 utterances. In total, there was agreement for 176 utterances, reaching a point-to-point percentage agreement of 86.76%.

Language Performance Measures

The following measures of language form were calculated automatically using SALT based on their reported sensitivity to age (Berman & Verhoeven, 2002; Nippold, 2014; Westerveld & Moran, 2013), verbal productivity (number of utterances and total number of words), and syntactic complexity (mean length of utterance in words). Semantic diversity (total number of different words) was also calculated in SALT as a measure of language content. Language content was explored further through the software program: Linguistic Inquiry and Word Count (LIWC2015; Pennebaker et al., 2015). LIWC2015 provides an efficient and reliable method of examining the lexical content of language samples, compared to the more time-consuming approach of manually coding target words such as mental state verbs. LIWC2015 has a default dictionary of almost 6,400 words and provides word counts across approximately 90 domains. Some categories represent functional words such as pronouns and prepositions, while others tap word meaning such as mental state verbs in the cognitive domain. Language samples, either written texts or transcriptions of spoken discourse, are entered as raw data into the computer program. LIWC2015 calculates the proportions of various categories of words by matching the words used in the text against the lexicon of predefined categories. Results are expressed in percentages of words used in each category. Three psychological constructs (affective, social, and cognitive) were chosen to describe the content of the samples and to determine where participants focused their attention for the critical thinking task. The LIWC2015 dictionary contains 1,393 words and word stems in the affective domain, 756 in the social, and 797 in the cognitive.

Language use in critical thinking was described by employing a coding scheme, developed from Bloom's revised taxonomy of thinking (Anderson & Krathwohl, 2001). As a well-respected classification system of cognitive processing, Bloom's taxonomy has been commonly used by educators

from secondary to tertiary settings to assess students' levels of understanding. Plack et al. (2007) piloted an assessment tool based on Bloom's taxonomy to objectively assess the reflective journals of medical students. Their aim was to evaluate the higher order thinking skills underlying these reflections. Plack et al. collapsed the six levels of thinking into three: Level 1 (L1), data gathering (remembering and understanding); Level 2 (L2), data analysis (applying and analyzing); and Level 3 (L3), conclusion drawing (evaluating and creating)—successfully trialing the assessment tool in the 2007 study. It was considered that the coding schema developed by Plack et al. could have equal application in the assessment of critical thinking skills in adolescents. Definitions for each level in the current study were closely mapped to this model, with examples drawn specifically from the responses to the moral dilemma task. A code book was developed through reviewing the raw transcripts and employing a consensus process between researchers (first and final authors). It was agreed that L1 demonstrates basic understanding through comments based directly on the original story and making unsupported judgments, L2 involves some initial analysis of the information, while L3 looks beyond the “here and now” to evaluate characters' actions and decisions and reflect on the moral lessons of the situation.

Transcriptions were segmented into utterances as grammatical units rather than propositional units. Consequently, some utterances that followed an initial statement were considered a continuation of the proposition by adding information or supporting evidence but did not contribute new thinking. Such utterances could be counted as a separate C-unit for transcribing purposes but were coded as a continuing utterance—LC1, LC2, or LC3. Utterances that were repetitions of previous statements were coded as MR (miscellaneous repetition), whether it was verbatim or very close. Finally, a small number of utterances were noted to lack content and were therefore unable to be attributed to a level, either because they were too vague (MV: miscellaneous vague) or because the statement was irrelevant to the central topic (MI: miscellaneous irrelevant). More detailed descriptors used in coding are provided in Appendix B; Appendix C provides examples of L1, L2, and L3 utterances. The complete code book is included as an online supplementary file.

Data Analysis

In addressing the research questions, multiple analyses were conducted, which potentially increased the possibility of familywise error. However, Bonferroni correction was considered too conservative (Perneger, 1998), especially for such exploratory analyses; hence *p* values were set at .05. In all calculations of effect size, Cohen's *d* was used and reported as small (0.2–0.49), medium (0.5–0.79), or large (0.8 and above; Cohen, 1992). Performances on Story 1 and Story 2 were compared for measures of verbal productivity, syntactic complexity, semantic diversity, and percentages of utterances at L1, L2, and L3 using a series of paired-samples *t* tests to identify possible practice effects. Results of these

comparisons showed no significant differences between the two stories on any language measure, and as a result, data from the two stories were combined and totals used for all analyses. Visual inspection of QQ plots indicated an abnormal distribution for mean length of utterance in the OA group due to one outlier. Independent *t* tests were run with and without the outlier; however, no significant differences were found, and so the outlier was retained. Inspection of all other measures for normality, skewness, and kurtosis showed normal distributions.

Results

Research Question 1 was aimed at describing the form and content of the language samples.

Language Form

The language performance of the YA and OA was initially compared on measures of verbal productivity (total number of utterances, total number of words) and syntactic complexity (mean length of utterance) as measures of language form. Table 1 presents the results of this descriptive analysis. Results of independent *t* tests showed no significant differences between the YA and OA groups for total number of utterances, $t(42) = 0.67, p = .51, d = 0.20$; mean length of utterance, $t(42) = 1.34, p = .18, d = 0.41$; and total number of words, $t(42) = 1.59, p = .12, d = 0.48$.

Language Content

Language content was compared between the YA and OA groups, based on measures of semantic variance (total number of different words) and semantic content (percentage of words for affective, social, and cognitive domains). Results of these analyses are presented in Table 2.

A multivariate analysis of variance (MANOVA) was used to examine age-related differences in language performance for all four semantic measures. Before conducting the MANOVA, the data were examined to ensure all underlying assumptions were met. Findings showed a significant difference between the YA and OA groups on the combined measures of semantics, $F(4, 39) = 3.64, p = .013, \eta_p^2 = .27$. Analysis of individual variables showed no differences for the percentage of words in social and cognitive domains. However, the total number of different words and percentage of

Table 2. Language measures of content for younger adolescents (YA) and older adolescents (OA; stories combined).

Variable		YA (<i>n</i> = 24)	OA (<i>n</i> = 20)
Number of different words*	<i>M</i> (<i>SD</i>)	159.75 (31.30)	187.80 (35.34)
	Range	118–235	122–247
Percentage of words, affective**	<i>M</i> (<i>SD</i>)	4.03 (1.22)	5.00 (1.13)
	Range	2.30–6.84	2.67–7.36
Percentage of words, social	<i>M</i> (<i>SD</i>)	15.13 (2.60)	14.35 (2.42)
	Range	10.70–22.10	9.81–19.31
Percentage of words, cognitive	<i>M</i> (<i>SD</i>)	18.33 (3.10)	18.37 (2.35)
	Range	11.11–25.43	14.17–22.92

* $p < .05$. ** $p < .01$.

words in the affective domain showed statistically significant age-related differences, where OA produced a higher number of different words, $F(1, 42) = 7.79, p = .008, \eta_p^2 = .16$, and more words in the affective domain, $F(1, 42) = 7.34, p = .010, \eta_p^2 = .15$.

Language Use

To answer Research Question 2, percentages of each type of utterance based on the coding system were calculated for YA and OA groups, and results for each code are presented in Table 3. The performance of YA and OA groups was then compared based on the total numbers of utterances coded as L1, L2, and L3. Repeated (MR), irrelevant (MI), and vague (MV) utterances were not considered at this time. Again, results for stories were combined. Table 4 summarizes the descriptive statistics for these measures.

Results were then examined to determine age-related differences in the use of L1, L2, and L3 utterances. However, the data did not satisfy all underlying assumptions for MANOVA; therefore, univariate analyses of variance were used to examine results. L1 utterances were significantly higher for the YA group, $F(1, 42) = 19.25, p < .001, \eta_p^2 = .31$, and L3 utterances were significantly higher for the OA group, $F(1, 42) = 31.74, p < .001, \eta_p^2 = .43$. No significant difference between the two groups was found for L2 utterances, $F(1, 42) = 0.45, p = .51, \eta_p^2 = .01$.

Research Question 3 assessed the size and direction of two relationships: first, between language use and form,

Table 1. Language measures of form for younger adolescents (YA) and older adolescents (OA; stories combined).

Variable		YA (<i>n</i> = 24)	OA (<i>n</i> = 20)
Total number of utterances	<i>M</i> (<i>SD</i>)	29.67 (9.64)	31.7 (10.51)
	Range	17–50	13–58
Mean length of utterances	<i>M</i> (<i>SD</i>)	13.16 (2.58)	14.34 (3.25)
	Range	8.34–18.48	9.21–24.44
Total number of words	<i>M</i> (<i>SD</i>)	380.75 (113.00)	438.35 (127.10)
	Range	217–594	234–689

Table 3. Percentages of type of utterances for younger adolescents (YA) and older adolescents (OA; stories combined).

Types of utterances	YA (<i>n</i> = 24)	OA (<i>n</i> = 20)
% Utterances Level 1 (L1 + LC1)	37.92%	13.56%
% Utterances Level 2 (L2 + LC2)	47.89%	50.16%
% Utterances Level 3 (L3 + LC3)	5.20%	28.08%
% Utterances, repetitions (MR)	1.69%	2.84%
% Utterances, irrelevant (MI)	5.20%	1.74%
% Utterances, vague (MV)	1.69%	3.31%
	99.58%	99.68%

Table 4. Performance of younger adolescents (YA) and older adolescents (OA) on levels of critical thinking (stories combined).

Variables		YA (<i>n</i> = 24)	OA (<i>n</i> = 20)
Total numbers of Level 1 utterances (L1 + LC1)**	<i>M</i> (<i>SD</i>)	11.42 (6.60)	4.45 (2.84)
	Range	2–29	1–12
Total numbers of Level 2 utterances (L2 + LC2)	<i>M</i> (<i>SD</i>)	14.50 (8.30)	16.15 (7.87)
	Range	2–40	4–34
Total numbers of Level 3 utterances (L3 + LC3)**	<i>M</i> (<i>SD</i>)	1.58 (2.55)	9.10 (5.92)
	Range	0–10	1–22

***p* < .01.

and second, between language use and content. We examined correlations between the three language performance measures of form and the three levels of thinking. Strength of correlation was determined as moderate for scores between .40 and .59, strong for scores between .60 and .79, and very strong for scores over .80 (Cohen, 1992). Table 5 displays the correlation matrix across the variables of form (total number of C-units, mean length of utterance, total number of words) and the total number of utterances at L1, L2, and L3.

A strong correlation was found between total number of C-units and total number of L2 utterances ($r = .68$, $p < .001$). Moderate correlations were reported between total number of words and numbers of L2 ($r = .48$, $p = .001$) and L3 ($r = .50$, $p = .001$) utterances. Significant but small correlations were recorded between mean length of utterance and each of the three levels of thinking (L1, $r = -.35$, $p = .019$; L2, $r = -.37$, $p = .013$; and L3, $r = .35$, $p = .019$). A very strong correlation was found between the total number of words and total number of C-units ($r = .80$, $p < .001$). Table 6 displays the correlations matrix across the variables of content (total number of different words and total percentages of affective, social, and cognitive domains) and again the total number of utterances for L1, L2, and L3.

Moderate correlations were found between the total number of different words and total number of L2 ($r = .42$, $p = .005$) and L3 ($r = .55$, $p < .001$) utterances. A small and negative correlation between total number of L1 utterances and affective words was also found ($r = -.31$, $p = .039$). A small and negative correlation was also found between the total percentage of affective words and social words ($r = -.32$, $p = .03$).

Discussion

The purpose of this study was to investigate and describe the discourse production of typically developing adolescents in two age groups in their responses to a moral dilemma task. In the first research question, we investigated the form and content of adolescent language performance through the measures of verbal productivity, syntactic complexity, semantic diversity, and percentage of words in three semantic domains: affective, social, and cognitive. The moral dilemma task was effective in eliciting an extended language sample in terms of total number of utterances (ranging from 12 to 58) with strong evidence of complex syntax (mean length of utterance in words ranging from 9.16 to 21.67). Although the OA produced longer utterances than the YA, this difference was not significant. These results seem in line with previous studies into the discourse production of children and adolescents who have reported a slow and gradual increase in syntactic complexity (Nippold et al., 2005, 2007; Ravid & Berman, 2006; Westerveld & Moran, 2013). More recently, Hill et al. (2020) studied the language samples of 160 adolescents from four age groups, comparing their responses on four different spoken language tasks and reported no significant age-related differences on syntactic measures. However, direct comparison is difficult as age ranges, measures, cohort, elicitation task, and mode vary considerably between the studies.

A significant group difference was found on the language measure of semantic diversity, with the OA group using a higher number of different words than the YA group. In the semantic domains, there was a significantly greater percentage of words used relating to cognitive processes than social or affective for both age groups, suggesting that the moral dilemma task is successful in stimulating a cognitive response and that this is reflected in the language content. It was interesting to note that the only age-related difference between the groups was found in the affective domain, with the OA group using a greater percentage of emotional vocabulary in their response. This could be accounted for by a greater mastery of higher order language in developing a broader emotional literacy. However, these results could also be interpreted as corresponding to changes in adolescent development described by Kohlberg's stages of moral development, where OA move beyond the need for approval from others and are beginning to understand that

Table 5. Associations of language performance on measures for form and use (all participants).

Variables	TNCU	MLU	TNW	TNL1	TNL2	TNL3
Total number of C-units (TNCU)	—					
Mean length of utterance (MLU)	-.43*	—				
Total number of words (TNW)	.80**	.14	—			
Total number of Level 1 utterances (TNL1)	.22	-.35*	.01	—		
Total number of Level 2 utterances (TNL2)	.68**	-.37*	.48**	-.21	—	
Total number of Level 3 utterances (TNL3)	.18	.35*	.50**	-.57**	-.03	—

* $p < .05$, two-tailed. ** $p < .01$, two-tailed.

Table 6. Associations of language performance on measures for content and use (all participants).

Variables	TDW	AFF	SOC	COG	TNL1	TNL2	TNL3
Total number of different words (TDW)	—						
Percentage of words, affective (AFF)	.13	—					
Percentage of words, social (SOC)	-.01	-.32*	—				
Percentage of words, cognitive (COG)	.07	-.07	.03	—			
Total number of Level 1 utterances, (TNL1)	-.04	-.31*	-.16	-.24	—		
Total number of Level 2 utterances (TNL2)	.42**	.07	.21	.09	-.21	—	
Total number of Level 3 utterances (TNL3)	.55**	.21	.02	.26	-.57**	-.03	—

* $p < .05$, two-tailed. ** $p < .01$, two-tailed.

individual needs and perspective can be distinct from societal needs. Adolescents still apply laws somewhat rigidly, expecting that everyone is obliged to comply, but their comments on this task suggest that they can sympathize with the emotional context behind decisions to disobey. The small, negative correlation between the word counts for affective and social domains may provide further insight on this point, suggesting that increases found in the affective domain is at the expense of words reflecting a social perspective, rather than the cognitive domain.

In Question 2, we compared YA and OA in their use of language to support critical thinking. The coding scheme developed for this study and, based on Bloom's revised taxonomy of thinking (Anderson & Krathwohl, 2001), was successful for describing language use and clearly reflected age-related differences. Results revealed that the YA group used a significantly higher percentage of L1 utterances, while the OA group produced a greater percentage of L3 utterances. This group difference in participants' responses is likely to reflect a developmental progression in critical thinking, as manifested in their language use in response to the moral dilemma stories. When investigating the association between the various language features, correlations were identified between the semantic measure of number of different words and the levels of critical thinking at the higher levels (L2 and L3), but not for verbal productivity or syntactic complexity. Overall, in contrast with Nippold et al.'s (2014, 2015) findings, we found that aspects of language content and use appear to underscore the growth of critical thinking skills, rather than language form. However, it is likely that there is a complex interplay between all three aspects of language that requires further investigation.

Critical thinking is strongly reflected in many education curricula, whether embedded in a core standard (National Governors Association Centre for Best Practices, 2010) or underpinning subject areas as a general capability (ACARA, 2012). However, critical thinking is also commonly required in social and workplace settings, as individuals express their opinions on different topics, with a range of communicators, and in a variety of contexts (Stupple et al., 2017). The moral dilemma task targets this aspect of critical thinking by challenging adolescents with the "unfairness" of difficult situations. Incongruence is created when the main character acts against societal norms, while at the same time, their actions

are presented as justifiable on moral grounds. The stories and characters are easily placed within a real context, unlike the fables of Nippold's studies, which are more metaphorical (Nippold et al., 2014, 2015, 2020). Fables such as *The Fox and the Grapes* present universal themes, readily applicable on a societal level. While these may be useful as exemplifying tasks commonly found in educational curricula, the moral dilemma task employed in this study is designed to challenge the adolescent on a more personal and interpersonal level.

Despite the differences in the two tasks, interpreting the moral messages in fables as reported by Nippold et al. (2020) compared to responding to the moral dilemmas faced by real-world characters as used in this study, similar outcomes were achieved. Importantly, we found an age-related progression in critical thinking skills that could be demonstrated in the adolescents' use of language. Nippold et al. reported that OA were likely to provide more evidence to support and justify their decisions, whereas the current study demonstrates higher level thinking skills in the OA through the greater percentage of evaluative and reflective comments. Taken together, these findings align with developmental studies of cognition (Spear, 2017) and moral reasoning (Morris et al., 2011).

The complex scenarios presented in the moral dilemma task challenge and provoke the adolescent, creating a dissonance between their feelings of sympathy toward the characters and their understanding of social norms, knowing that the characters have acted against these norms (Weinstock et al., 2009). The YA group expressed more L1 utterances; commonly restating information from the story and commenting about the thoughts and feelings of the characters but without elaboration or evaluation. While they may have identified the main issue, there was little analysis of the central dilemma by YA, and judgments were made without supporting reasons. In contrast, OA used L3 utterances to comment on the biases and values underlying the actions of characters, theorizing on their motivations and looking for reasons to justify decisions. They evaluated the actions of the characters while, at the same time, noting the exigency of the context. Older adolescents provided more supporting evidence and often drew attention to universal themes exemplified in the stories. Appendix C provides examples drawn from the responses of participants in both age groups that illustrate these factors.

Clinical Implications

The strength of discourse analysis in assessing the language performance of adolescents is its ability to reflect the speaker's competency in using words, sentences, and text in naturalistic settings (Miller et al., 2015; Nippold et al., 2017; Westerveld & Claessen, 2014). As Hill et al. (2020) highlight, discourse production is a complex and multifaceted skill that requires integration and processing of various levels of language skills, in form, content, and use. Westerveld and Claessen (2014) argue that adolescents are expected to produce a greater range of text types, such as persuasive and expository texts in specialized subject areas through secondary school compared to narrative (ACARA, 2012). It follows that there is a need for adolescents' complex language to be evaluated in these nonnarrative discourse genres (see also Lundine, 2020). Nippold et al. (2014) emphasized that speakers need to be stimulated to produce complex language using strategies that effectively prompt them to talk about complex topics. The moral dilemma task accomplishes this, eliciting the spontaneous generation of a nonnarrative discourse in response to a complex topic. The nature of the task provides an opportunity to capture the "messiness" of spontaneous communication, providing a more ecologically valid task for evaluating complex language at word, sentence, and text levels (Boudreau, 2008).

The sampling method described here successfully stimulated complex language production, as evidenced by syntactic complexity and a predominance of cognitive word choices over those from a social or emotional domain. The coding scheme developed to describe language use in critical thinking was effective in its application to the discourse samples. Overall, the moral dilemma task appears to capture the key aspects of language skills required in critical thinking. Bloom's revised taxonomy of thinking (Anderson & Krathwohl, 2001) is a familiar framework for teachers and, as such, provides a shared basis for discussion between speech pathologists and classroom teachers regarding a young person's language performance in this important area of the curriculum. Although the coding system requires some training to ensure interrater reliability, it addresses an area of language use not previously reported on in the literature. Critical thinking is an important skill in any educational curriculum but also plays an important role in the progression toward autonomy and development of a personal identity. Speech-language pathologists need to understand these developmental changes in order to identify how they impact on adolescents' functioning, whether for learning or for emotional and social well-being. Our findings suggest that the moral dilemma task, in conjunction with the language performance analyses in form, content, and use, is a valuable tool for assessing adolescent discourse that could be added to the repertoire of speech pathologists across clinical settings.

Plack et al. (2007) suggested using their clinical instrument with student medical staff to deepen the student's reflective practices. The same application could be employed here, working with students in educational settings to demonstrate the type of language used in expressing higher level

critical thinking. Providing examples of statements reflecting L1, L2, and L3 could help to scaffold students' written responses on classroom activities that require critical thinking and reasoning, in particular for students with language or learning disorders. A set of example statements and descriptors for each level could be developed into a learning matrix, similar to those commonly used by teaching staff when setting assessment criteria. Material could also be developed that highlights word choices from the cognitive domain to focus students' attention onto critical thinking skills. A vocabulary of mental state verbs such as consider, contemplate, examine, judge, and evaluate may support a deeper focus on the critical aspects under consideration. The moral dilemma task also has application in the mental health setting. Identifying the level of thinking in adolescent clients through their oral responses to these dilemmas could provide useful insight for the clinician. For example, if an adolescent was found to be functioning predominantly at L1 and L2 in their responses, mental health clinicians could be advised to target their own communication to this level when working with the adolescent. Understanding how language is used in critical thinking to effectively engage in clinical tasks requiring equivalent skills for self-reflection and evaluation could support and facilitate important conversations between clinician and client.

Limitations and Future Research

Participants in this study were drawn from the personal and professional networks of the first author and therefore may not be a representative sample of Australian adolescents. However, Australia has a national curriculum, and this may have mitigated the potential impact of this limitation. This is a relatively small sample, and inclusionary criteria aimed at ensuring other potential factors influencing discourse were minimized. Hence, all participants spoke English as their first language and demonstrated at least average academic achievement. A wider application of these findings is limited as a result. The same presentation sequence of the two stories was used for each participant, which may have contributed to a practice effect. Consequently, participants may have felt more confident in the second story, resulting in some uplift in their performance. However, no significant differences were found on any measure of language performance or level of thinking between the stories. Nonetheless, future research should consider counterbalancing the presentation order to clarify the potential impact of a practice effect.

Replication of this study with a greater number of typically developing adolescents would be helpful in establishing normative data for this age group. This line of research can then be expanded to clinical populations (such as developmental language disorder, autism spectrum disorder, or anxiety disorder) to investigate its sensitivity for language status. Given the social contexts of the moral dilemma stories, future studies could also explore the discourse production of adolescents from different cultural backgrounds. Research into other forms of expository discourse

have used strategies such as providing extra time to consider the response or even providing a graphic organizer to assist in planning. Such strategies and variations could easily be embedded in this task to evaluate the impact on an individual's responses, which in turn could provide valuable information for developing intervention programs targeting the language of critical thinking. A final direction of future research would be to investigate the development of these language skills in a single cohort across time, as compared to this cross-sectional study design.

Conclusions

The current study contributes to a growing body of research in examining the discourse of critical thinking, supporting the use of the moral dilemma task and application of the coding system. We explored the progression of critical thinking skills from early to late adolescence through salient features of language form, content, and use. Although there was no significant growth in skills noted for language form and growth was only demonstrated in two measures of language content, language use showed a definite age-related shift between younger and older age groups. As adolescents move through secondary school, the increasing demands on language and thinking is reflected in the expectations of various curriculum subjects. The coding scheme based Bloom's revised taxonomy of thinking (Anderson & Krathwohl, 2001) will be readily understood by teachers and other professionals, allowing speech pathology clinicians and school staff to collaborate in identifying implications for intervention. Being able to identify the level of thinking based on language use will also assist the clinician in supporting adolescents presenting with mental health concerns, particularly in adapting their own level of language to match the adolescent.

Author Contributions

Adele K. Wallis: Conceptualization, Investigation, Project administration, Methodology, Writing – original draft, review & editing. **Marleen F. Westerveld:** Conceptualization (Supporting), Methodology (Supporting), Supervision (Lead), Validation (Equal), Writing – original draft (Supporting), Writing – review & editing (Supporting). **Allison M. Waters:** Conceptualization (Supporting), Methodology (Supporting), Supervision (Supporting), Writing – original draft (Supporting), Writing – review & editing (Supporting). **Pamela C. Snow:** Investigation (Supporting), Supervision (Supporting), Writing – original draft (Supporting), Writing – review & editing (Supporting).

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Appendix A

Assessment Protocol and Moral Dilemma Stories

Introduction: This activity involves listening to two stories. They describe a moral dilemma for the characters. Please listen carefully. I will read the paragraphs, while you will be able to read along. After each story, I will turn on the digital recorder. I would like you to tell me whatever this paragraph makes you think about. You will be recorded for 2 minutes. There are no right or wrong responses—I am just interested in what your thoughts are.

Retrieved from: <http://ww3.haverford.edu/psychology/ddavis/p109g/kohlberg.dilemmas.html>

Judy's Story

Judy was a 14-year-old girl. Her mother promised her that she could go to a special rock concert coming to their town if she saved up money from babysitting and lunch money to buy a ticket to the concert. She managed to save up the 100 dollars that the ticket cost plus another 20 dollars. But then, her mother changed her mind and told Judy that she had to spend the money on new clothes for school. Judy was disappointed and decided to go to the concert anyway. She bought a ticket and told her mother that she had only been able to save 10 dollars. That Saturday, she went to the performance and told her mother that she was spending the day with a friend. A week passed without her mother finding out. Judy then told her older sister Lisa that she had gone to the performance and had lied to her mother about it. Lisa wonders whether to tell their mother what Judy did.

Simon's Story

A woman was near death from a special kind of cancer. There was one drug that the doctors thought might save her. It was a form of radium that a pharmacist in the same town had recently discovered. The drug was expensive to make, but the pharmacist was charging 10 times what the drug cost him to produce. He paid \$1,000 for the radium and charged \$10,000 for a small dose of the drug. The sick woman's husband, Simon, went to everyone he knew to borrow the money, but he could only get together about \$5,000, which is half of what it costs. He told the pharmacist that his wife was dying and asked him to sell it cheaper or let him pay later. But the pharmacist said: "No, I discovered the drug and I'm going to make money from it." So Simon got desperate and broke into the man's store to steal the drug for his wife.

Allowable general prompts:

Can you tell me more about that?

What else does this story make you think about?

Secondary prompts:

(Ask the following questions after time has elapsed, which indicates that the individual has nothing more to say, and if they have not been answered already, i.e., ask about a specific character, if that character hasn't been mentioned.)

What do you think about Judy/the mother/Lisa/Simon/the pharmacist in this story?

What do you think about what Judy/the mother/Lisa/Simon/the pharmacist did?

What do you think should happen next?

Record the individual's response and allow up to 2 minutes of recording.

Appendix B

Coding System, a Brief Overview

L3	Level 3 Conclusion drawing	Evaluating & Creating: The adolescent shares new theories or predictions, draws conclusions, and may conjecture into lessons learned. There is demonstrated awareness of the biases and values underpinning the actions of characters, hypothesizing on their motivations, and justifying decisions. Judgments are made with supporting evidence and “universal” themes and issues may be explored.
L2	Level 2 Information analysis	Applying & Analyzing: The adolescent considers what happened differentiating between thoughts, feelings, and actions, reflecting on motivations of the characters. They may also examine alternative explanations by looking beyond the basic facts and considering a range of possible outcomes.
L1	Level 1 Information gathering	Remembering & Understanding: The adolescent demonstrates understanding by restating specific information from the story. There may be comments about thoughts and feelings of the characters, identifying the main issue, noting what might happen next, and commenting on aspects that might be of interest or confusing. Stories may be related to personal experiences.
LC	Continuation	Statements that follow on from previous utterance, elaborating a point and providing extra description or supporting argument; do not introduce new information.
LR	Repetition	Statements that simply repeat what has previously been said without adding any new material or thought; reiteration of information for emphasis
MI	Miscellaneous irrelevant	Statements that might be “lessons” or provide information but are not related directly to the current moral issue
MV	Miscellaneous vague	Open statements that are difficult to identify a main point in relation to the current moral dilemma being discussed

Coding system based on Bloom’s revised taxonomy of thinking (Anderson & Krathwohl, 2001) and adapted from Plack et al. (2007).

Appendix C

Examples of the Language Used in Levels 1, 2, and 3 of Thinking

Level 1. Information gathering

YA: Well it’s bad that Judy’s mum lied like. (stating judgments)

YA: Simon will go to jail of course. (making predictions)

OA: It says they raised 5,000 dollars out of the 10. (restating information)

OA: Like in shoes (like) they probably cost about eight dollars to make.
(relating to personal experience)

Level 2. Information analysis

YA: And he could’ve done like other options like fundraised could’ve like made something like or an ad on TV or something, but then those cost a lot, to like help raise money for her. (alternative outcomes)

YA: But I also think it was silly that her mother didn’t find out which friend and ask what they did on that day. (reflecting on actions)

OA: I guess she felt pretty guilty about it so she had to tell someone which was her elder sister. (reflecting on motivations)

OA: To reduce yourself to breaking and entering obviously, he has to be really keen to keep his wife alive, which is obvious anyone would be heck yeah. (commenting on feelings)

Level 3. Drawing conclusions

YA: And that like if the mum found out that would like break her heart and make them lose their trust. (evaluating actions)

OA: So he probably would’ve had a lot of emotions going through his head because you know he probably would’ve thought “well should I just enjoy the time with my wife now or should I risk this and save her,” which is the option he chose. (drawing conclusions)

OA: It’s kind of a bit of a learning curve for Judy as well (uhm) realizing that as much as you might want to do something, sometimes life isn’t going to go your way. (universal statement)

Note. OA = Older adolescent, YA = Younger adolescent.
