

Technical Report UOD-SOC-2012
Collation of Formal Dialectical Games from the
literature

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Abstract

This report collates and presents the original formulation and presentation of rules from a range of dialectical games that were used to delineate the range of rule types that the Dialogue Game Description Language (DGDL) must support. The aim is to provide a common reference that can be used when working with and comparing common DGDL re-formulations of games rules to the formulations presented by their original authors. The games presented in this report are Hamblin's game 'H', Mackenzie's game 'DC', Walton's game 'CBZ', Walton & Krabbe's game 'PPD₀', and Bench-Capon's game 'TDG'.

1 INTRODUCTION

This technical report provides an extended appendix for the work published in [27] which introduced the Dialogue Game Description Language (DGDL). The DGDL is a description language that is underpinned by a formal grammar, expressed in EBNF [28], and is exemplified by a canonical ANTLR [5] implementation ¹.

The DGDL was developed over several years and has its roots in a number of earlier publications. Early ideas that surveyed various aspects of dialectical game rules and approaches to unifying the representation of said rules were presented in [17] which provided motivation for the development of, and an early presentational style for, the DGDL, [19] which explored the role of cumulateness and the rules for capturing cumulativity with dialogue game, and [14] which introduced a common runtime for a

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¹<http://siwells.github.io/DGDL/>

range of dialectical games that were utilised by a Multi-Agent System (MAS) to solve a distributed instances of map-colouring problems.

Whilst a core goal of the DGDL is to provide a consistent and precise language for describing dialectical games, a second important goal was to provide a mechanism and supporting tooling for evaluating and exploiting dialectical games within intelligent software systems. To this end, a couple of publications explore approaches to dialectical game evaluation, namely [16] which introduced the concept of a set of core problems that could be used to bench-mark progress in dialectical game research, and [18] which introduced a range of attributes and measurements that can be used to characterise and compare dialectical games.

Exploitation of dialectical games using the DGDL has been reported in a range of publications, including [20], [21], [3], [8], [23], [26], [25], [10], [24], [15], [7], [9], and [11]. In [21] and [20] the support within the DGDL for dialogue shifts was exploited to demonstrate a shift between dialogue types, referred to as the fallacy of bargaining, that occurs when an argumentative dialogue moves from using persuasive arguments to negotiating acceptable outcomes. In the work reported in [3] the DGDL was used to facilitate argumentative dialogue capabilities within a MAS that used planning and social reasoning to manage distributed resources. In [8], [23], and [24] the DGDL was used to describe the communication protocols between heterogeneous groups of intelligent, arguing agents and people in a mixed-initiative, online-discussion system. In [25] the DGDL was used to describe the communication protocols for a prototype arguing agents system that built on the ideas proposed in [16] and [22] and used competing agents as a new way to evaluate progress in dialectical argument research, an approach inspired by the series of Trading Agent Competitions (TAC) which benchmark progress in the development of effective trading agents. In [15] the DGDL was used to describe the communication protocols that enable different online argumentative dialogue systems to share common interactions and this process was exemplified in the Argument Blogging prototype. In [10] an extension to the AIF, named AIF+, was presented that proposed the use of DGDL as a way to extend AIF support for dialogue by describing dialogue protocols using DGDL descriptions. The work in [10] was taken in different direction in [7] and [9] to build bridges between existing web dialogue systems, such as MAgtALO [8] and InterLoc [6] using the DGDL as an interlingua, and to explore the role that dialogue plays, specifically the interplay of and effects of uttering chains of individual performatives and their resulting effects, in the co-construction of arguments.

The goal of this report is to supplement the DGDL by providing a cohesive collection of extant dialectical games from the literature. By collating these games in a single report it becomes easier to work with the original sets of rules without having to track down, sometimes quite obscure, workshop papers spanning several decades. As a result, the aim of this report is to provide a useful resource for working with dialectical games in the original form in which they were introduced, as opposed to the modified form utilised by the DGDL.

The remainder of this report is organised as follows. In section 2 a range of games from the literature are presented, with one game per subsection. Sub-section 2.1 presents the rules of Hamblin's game 'H' [2], sub-section 2.2 presents the rules of Mackenzie's game 'DC' [4], sub-section 2.4 presents the rules of Walton's game 'CBZ' [12], sub-section 2.5 presents the rules of Walton and Krabbe's game 'PPD₀' [13], and finally sub-section 2.6 presents the rules of Bench-Capon's game 'TDG' [1].

2 The Games

This section presents the rules of a range of dialectical games from the research literature. The selected games are meant to be representative of the set of games available at the time of writing, and comprehensive with respect to the range of types of rules that exist in these games. Unlike the presentation of the self-same games in [27] these games are presented in the form in which they appeared when introduced by their original authors.

2.1 Hamblin's 'H'

2.1.1 Hamblin's Game 'H'

Locutional Rules :

- 'Statement S' or, in certain special cases, 'Statements S, T'.
- 'No commitment S, T, ..., X' for any number of statements S, T, ..., X (one or more).
- 'Question S, T, ..., X?' for any number of statements (one or more).
- 'Why S?' for any statement S other than a substitution-instance of an axiom.
- 'Resolve S'

Syntactical Rules :

- S1 Each speaker contributes one locution at a time, except that a 'No commitment' locution may accompany a 'Why' one.
- S2 'Question S, T, ..., X?' must be followed by
 - (a) 'Statement $\neg(S \vee T \vee \dots \vee X)$ '
 - or (b) 'No commitment $S \vee T \vee \dots \vee X$ '
 - or (c) 'Statement S' or
'Statement T' or
_____ or
'Statement X'
 - or (d) 'No commitment S, T, ..., X.'
- S3 'Why S?' must be followed by
 - (a) 'Statement $\neg S$ '
 - or (b) 'No commitment S'
 - or (c) 'Statement T' where T is equivalent to S by primitive definition
 - or (d) 'Statements T, $T \supset S$ ' for any T
- S4 'Statements S, T' may not be used except as in 3(d)
- S5 'Resolve S' must be followed by
 - (a) 'No commitment S'

or (b) 'No commitment $\neg S$ '

Commitment-Store Operations :

- C1 'Statement S' places S in the speaker's commitment store except when it is already there, and in the hearer's commitment store unless his next locution states $\neg S$ or indicates 'No commitment' to S (with or without other statements); or, if the hearer's next locution is 'Why S?', insertion of S in the hearer's store is suspended but will take place as soon as the hearer explicitly or tacitly accepts the proffered reasons (see below).
- C2 'Statements S, T' places both S and T in the speaker's and hearer's commitment stores under the same conditions as in C1.
- C3 'No commitment S, T, ..., X' deletes from the speaker's commitment store any of S, T, ..., X that are in it and are not axioms.
- C4 'Question S, T, ..., X?' places the statement $S \vee T \vee \dots \vee X$ in the speaker's store unless it is already there, and in the hearer's store unless he replies with 'Statement $\neg(S \vee T \vee \dots \vee X)$ ' or 'No commitment $S \vee T \vee \dots \vee X$ '
- C5 'Why S?' places S in the hearer's commitment store unless it is there already or he replies 'Statement $\neg S$ ' or 'No commitment S'.

2.1.2 The Additional Rules of H

Additional :

- A1 Question S, T, , X? may occur only when $S \vee T \vee \dots \vee X$ is already a commitment of both speaker and hearer.
- A2 Statement S may not occur when S is a commitment of the hearer.
- A3 Question S, T, , X? may not occur when any of S, T, , X is a commitment of the speaker.
- A4 Statement S may not occur when S is already a commitment of both speaker and hearer.
- A5 Question S, T, , X? may not occur when any one or more of S, T, , X, is a commitment of the speaker and any one or more a commitment of the hearer.
- A6 Why S? may not be used unless S is a commitment of the hearer and not of the speaker.
- A7 The answer to Why S?, if it is not Statement $\neg S$ or No commitment S, must be in terms of statements that are already commitments of both speaker and hearer.
- A8a If there are commitments S, T, , X of one participant that are not those of the other, the second will, on any occasion on which he is not under compulsion to give some other locution, give Why S? or Why T? or or Why X?
- A8b If one participant has uttered Statement S or Statements S, T or Statements T, S and remains committed to S, and the other has been and remains uncommitted to it, the second will (on any occasion on which he is not under compulsion to give some other locution, give Why S? or Why T? or or Why X?)
- A9 When S is written into a commitment store it is written S_c if the other participants commitment store already contains S or S_c ; otherwise it is written S.

2.2 Mackenzie's 'DC'

2.2.1 Locutions

- (i) Statements. 'P', 'Q', etc. and truth-functional compounds of statements: 'Not P', 'If P then Q', 'Both P and Q'.
- (ii) Withdrawals. The withdrawal of the statement 'P' is 'No commitment P'.

- (iii) Questions. The question of the statement 'P' is 'Is it the case that P?'
- (iv) Challenges. The challenge of the statement 'P' is 'Why is it to be supposed that P?' (or briefly 'Why P?').
- (v) Resolution Demands. The resolution demand of the statement 'P' is 'Resolve whether P'.

2.2.2 Commitment Rules

Statements, CRS: After a statement 'P', unless the preceding event was a challenge, 'P' is included in both participants' commitments.

Defences, CRYS: After a statement 'P', when the preceding event was 'Why Q?', both 'P' and 'If P then Q' are included in both participants' commitments.

Withdrawals, CRW: After the withdrawal of 'P', the statement 'P' is not included in the speaker's commitment. The hearer's commitment is unchanged.

Challenges, CRW: After the challenge of 'P', the statement 'P' is included in the hearer's commitment; the statement 'P' is not included in the speaker's commitment; and the challenge 'Why P?' is included in the speaker's commitment.

Questions and Resolution demands, CRQ and CRR: These locutions do not themselves affect commitment.

Initial Commitment, CRO: The initial commitment of each participant is null.

2.2.3 Rules Of Dialogue

RForm: Each participant contributes a locution at a time, in turn; and each locution must be either a statement, or the withdrawal, question, challenge or resolution demand of a statement.

RRepstat: No statement may occur if it is a commitment of both speaker and hearer at that stage.

RImcon: A conditional whose consequent is an immediate consequence of its antecedent must not be withdrawn.

RQuest: After 'Is it the case that P?', the next event must be either 'P', 'Not P' or 'No commitment P'.

RLogCall: A conditional whose consequent is an immediate consequence of its antecedent must not be challenged.

RChall: After 'Why P?', the next event must be either;

1. 'No commitment P'; or

2. The resolution demand of an immediate consequence conditional whose consequent is 'P' and whose antecedent is a conjunction of statements to which the challenger is committed; or
3. A statement not under challenge with respect to its speaker (i.e., a statement to whose challenge its hearer is not committed).

RResolve: The resolution demand of 'P' can occur only if either;

1. 'P' is a conjunction of statements which are immediately inconsistent and to all of which its hearer is committed; or
2. 'P' is of the form 'If Q then R', and 'Q' is a conjunction of statements to all of which its hearer is committed; and 'R' is an immediate consequence of 'Q'; and the previous event was either 'No commitment R' or "'Why R?'".

RResolution: After 'Resolve whether P', the next event must be either;

1. The withdrawal of one of the conjuncts of 'P'; or
2. The withdrawal of one of the conjuncts of the antecedent of 'P'; or
3. The consequent of 'P'.

2.3 The Rules of DD (additional to DC)

The rules of DC, minus CRS, plus:

CR_{SS} : After a statement P unless the preceding event was a challenge, P is included in both participants commitments; and Why P? is not included in the speakers commitment

2.4 Walton's 'CBZ'

2.4.1 Locution Rules

- (i) Statements: Statement-letters, S, T, U, ..., are permissible locutions, and truth functional compounds of statement-letters.
- (ii) Withdrawals: 'No commitment S' is the locution for withdrawal (retraction) of a statement.
- (iii) Questions: The question 'S?' asks the hearer whether or not he wants to reply that S is true.
- (iv) Challenges: The challenge 'Why S?' requests some statement that can serve as a basis of proof for S.
- (v) Resolutions: The resolution 'S,S?' requests the hearer to select exactly one of the pair S,S.

2.4.2 Dialogue Rules

- (i) Each speaker takes his turn to move by advancing one locution at each move.
- (ii) A question 'S?' must be followed by:
 - (i) a statement 'S',
 - (ii) a statement 'S', or
 - (iii) 'no commitment S'.
- (iii) 'Why S?' must be followed by:
 - (i) 'no commitment S', or
 - (ii) some statement 'T'.
- (iv) For a speaker to legally pose a resolution-request 'S,S?', the hearer must be committed to at least one of the pair S,S.
- (v) A (legal) resolution-request must be followed by a statement 'S' or a statement 'S'.
- (vi) If a statement S and also its negation $\neg S$ become included in the light-side of a player's commitment store, the opposing player must pose a resolution request 'S,S?' at his next free move.
- (vii) If a speaker states 'No commitment S' but S is in his light-side commitment store, the hearer must pose a resolution request 'S,S?' at his next move.

2.4.3 Commitment Rules

- (i) After a player makes a statement, S, it is included in his commitment-store.
- (ii) After the withdrawal of S, the statement S is deleted from the speaker's commitment-store.
- (iii) 'Why S' places S in the hearer's commitment-store unless it is already there or unless the hearer immediately retracts his commitment to S.
- (iv) Every statement that is shown by the speaker to be an immediate consequence of statements that are commitments of the hearer then becomes a commitment of the hearer's and is included in his commitment-store.
- (v) No commitment that is shown to be an immediate consequence of statements that are commitments of the hearer may be withdrawn by the hearer, unless the speaker agrees.
- (vi) If a player states 'no commitment S' and S is included in the dark side of his commitment store, then S is immediately transferred into the light side of that player's commitment store.

- (vii) Whenever a statement S goes into the light-side of a player's commitment store, if its negation $\neg S$ is on the dark-side of that player's store it must immediately be transferred to the light-side. Similarly, S must go from the dark (if it is there) to the light-side as soon as S appears on the light-side.
- (viii) No commitment may be added to or deleted from a player's store except by one of the above six commitment rules.

2.4.4 Strategic Rules

- (i) Any player who makes a move other than those permitted by the six dialogue rules immediately loses the game.
- (ii) The first player to show that his own thesis is an immediate consequence of a set of light-side commitments of the other player wins the game.
- (iii) Both players agree in advance that the game will terminate after some finite number of moves.
- (iv) If nobody wins as in (ii) by the point agreed on in (iii), the game is a draw. Or if it becomes evident to all the players that the dark-sides of their commitment stores are empty, the game may be ended by universal consent. In the latter case, the players may agree to maintain their light-side commitment stores and begin with a new set of dark-side commitment stores.

2.5 Walton & Krabbe's PPD₀

2.5.1 Locution Rules

1 Permitted locutions are of the following types:

Statements :

Assertions a(P)

Concessions c(P)

Elementary Arguments : Δ soP

Questions :

Requests con(P)?

Extractors serious(P)?

Confronters resolve(P,Q)

Challenges P??

Retractions :

of commitment nc(P)

of strong commitment na(P)

2 Moves have the following structure:

$\langle nc(P)/na(P), c(P), resolve(P,Q), con(P)? serious(P)?, \Delta soP, P?? \rangle$

At each slot in the six-tuple more than one element of the indicated type is allowed. Not every slot needs to be filled. Besides moves of this structure, there are preparatory moves that precede the actual dialogue. In these preparatory moves, the locutions $a(P)$ and $c(P)$ are used. See commitment rule 2 below.

2.5.2 Commitment Rules

- 1 Each participant (B, W) has three commitment stores. For participant X these are indicated DX, AX_n, CX_n . (The index n refers to the stage of the discussion just completed.) DX , the set of X's dark-side commitments, remains fixed throughout the dialogue. Its elements are propositions. AX_n and CX_n contain formulas of L . These formulas are called light-side commitments. The elements of AX_n are called assertions of X and those of CX_n concessions of X. The formulas in CX_n that are not in AX_n are called mere concessions of X.
- 2 Preceding the actual dialogue there are some preparatory moves in which the contents of AW_0, CW_0, AB_0, CB_0 are determined. To put a formula into both AX_0 and CX_0 , X uses the expression $a(P)$. To put a formula merely into CX_0 , X uses the expression $c(P)$. The locutions $a(P)$ are permitted in preparatory moves only.
- 3 The preparatory moves (which shall not be formalised in detail) are such that at least AB_0 that $CW_0 AB_0 =$ and that $CB_0 AW_0 =$ (Moreover, clearly $AB CB_0$ and $AW_0 CA_0$.)
- 4a A retraction $nc(P)$ removes P from both the set of the speaker's assertions and the set of the speaker's concessions (if it is there in the first place). That is to say if X utters $nc(P)$ at the n th stage the PAX_n and $P CX_n$.
- 4b A retraction $na(P)$ removes P from the set of the speaker's assertions, but not from the set of the speaker's concessions.
- 5 $c(P)$ enters P into the speaker's set of concessions, but not into the speaker's set of assertions.
- 6 ΔsoP enters all the elements (explicit premises and warrant) of the argument ΔsoP into the set of assertions and into the set of concessions of the speaker.

2.5.3 Structural Rules

- 1 The parties move alternately. W makes the first move in the actual dialogue.
- 2 Each party in its first move challenges or concedes each initial assertion presented by the other party.
- 3 For each move

- a if the preceding move contained $\text{resolve}(P,Q)$, the speaker must use either $\text{nc}(P)$ or $\text{nc}(Q)$;
 - b if the preceding move contained $\text{con}(P)?$, the speaker must use $\text{c}(P)$ or $\text{nc}(P)$;
 - c if the preceding move contained $\text{serious}(P)?$, the speaker utters either $\text{c}(P)$ or $\text{nc}(P)$, but if the proposition expressed by P is in the dark-side commitment store of the speaker, the speaker must utter $\text{c}(P)$;
 - d if the preceding move contained ΔsoP the speaker must, for each element Q in the elementary argument ΔsoP that is not a concession of the speaker, and has not been challenged by the speaker thus far, either utter $\text{c}(Q)$ or $Q??$;
 - e if the preceding move contained $P??$, the speaker must utter an argument ΔsoP , or utter $\text{nc}(P)$ or $\text{na}(P)$.
- 4a** If the proposition expressed by P is in the dark-side commitment store of X and X has confirmed with an extractor $\text{serious}(P)?$, then the locution $\text{nc}(P)$ is not available to X for the rest of the dialogue;
- 4b** $\text{nc}(P)$ can be used only if either
- 1 the preceding move contained $\text{con}(P)?$ or $\text{serious}(P)?$, or
 - 2 P is a concession of the speaker;
- 4c** $\text{na}(P)$ can be used only if P is an assertion of the speaker.
- 5** A statement $\text{c}(P)$ is allowed only if P is not a concession of the speaker and either P is an assertion of the other party or the preceding move contained $\text{con}(P)?$ or $\text{serious}(P)?$
- 6** A request $\text{resolve}(P,Q)$ may be used only if
- 1 P and Q are explicit contradictories, and
 - 2 P and Q are both concessions of the listener.
- 7** A request $\text{con}(P)?$ may be used only if
- 1 one of the speaker's assertions is not among the concessions of the listener and
 - 2 P is not a concession of the listener.
- 8** The question $\text{serious}(P)?$ may be used only if the preceding move contained $\text{nc}(P)$ or $P??$
- 9** ΔsoP may be used only if P is not among the concessions of the listener and some earlier move contained $P??$
- 10** $P??$ can be used only if P is an unchallenged assertion of the listener and not a concession of the speaker (after completion of the move).
- 11** In each move the use of locutions of the forms $\text{nc}(P)$, $\text{na}(P)$, $\text{c}(P)$, $P??$ is to be such that after completion of the move the following are true:

- 1 For each elementary argument $\{P_1 \dots, P_n\}$ so C of the listener if P_1, \dots, P_n and $(P_1 \wedge \dots \wedge P_n) \rightarrow C$ are concessions of the speaker, then the conclusion is also a concession of the speaker.
 - 2 Each unchallenged assertion of the listener is a concession of the speaker.
 - 3 For each basic argument Δ of the speaker and for each Q that is an element of Δ , if Q is retracted by the speaker, then all the elements of Δ that are implicit or explicit immediate premises for Q must be retracted (as assertions, at least); moreover, if Q itself functions in Δ as an immediate premise for P , all Q 's copremises for P must be retracted. This procedure is recursive. (However, retraction of an element need not be put through if this element functions as a premise in some elementary argument of the speaker that is no part of a basic argument for Q or for a copremise of Q in Δ .)
- 12 A retracted initial thesis (assertion) cannot be reinstated as such.
 - 13 Each move and each dialogue is limited with respect to the number of its symbol tokens. (We shall not here formulate the precise rules to this effect.)

2.5.4 Win-and-Loss Rules

- 1 At the end of the dialogue, if X has retracted its initial thesis P , X is the loser and the other party the winner with respect to P ; however, if the other party has got P in its set of concessions by the end of the dialogue, X is the winner and the other party the loser with respect to P . In all other cases the dialogue is a draw with respect to P .

2.6 The Toulmin Dialogue Game 'TDG'

2.6.1 Rules of TDG

Claim (C) :

Description :

P asserts that C

Preconditions :

P has control of the dialogue

Postconditions :

O has control of the dialogue
C is pushed onto the claim stack
P is committed to C

Completion Conditions :

C is popped from the claim stack

Why (C) :

Description :

O seeks data supporting C

Preconditions :

O has control of the dialogue
C is top of the claim stack

Postconditions :

P has control of the dialogue

Completion Conditions :

C is not top of claim stack

OK (C) :

Description :

O accepts C

Preconditions :

O has control of the dialogue
C is top of the claim stack

Postconditions :

C is popped from the claim stack
O is committed to C
O is not committed to not C
If not C is on claim stack, it is removed
Referee has control of the dialogue

<p>Completion Conditions : None</p>	<p>Completion Conditions : D is popped from the claim stack</p>
<p>So (C) :</p> <p>Description : O requests the warrant for C</p> <p>Preconditions : O has control of the dialogue O is not committed to if D then C, for any D for which he is not committed to $\neg D$ C is top of claim stack</p> <p>Postconditions : P has control of the dialogue</p> <p>Completion Conditions : C is not top of the claim stack</p>	<p>Supply Warrant (C) :</p> <p>Description : P asserts that If D then C</p> <p>Preconditions : P has control of the dialogue O has issued a So (C) C is top of the claim stack</p> <p>Postconditions : P is committed to If D then C If D then C is pushed onto the claim stack O has control of the dialogue</p> <p>Completion Conditions : If D then C is popped from the claim stack</p>
<p>Presupposing (C) :</p> <p>Description : O requests the warrant for C</p> <p>Preconditions : O has control of the dialogue If D then C is top of the claim stack</p> <p>Postconditions : P has control of the dialogue</p> <p>Completion Conditions : If D then C is popped from the claim stack</p>	<p>Supply Presupposition (C) :</p> <p>Description : P asserts that S</p> <p>Preconditions : P has control of the dialogue O has issued a presupposing (C) If D then C is top of the claim stack</p> <p>Postconditions : P is committed to S P is committed to If not S then not C S is pushed onto the claim stack O has control of the dialogue</p> <p>Completion Conditions : S is popped from the claim stack</p>
<p>On Account Of (C) :</p> <p>Description : O requests the backing for the warrant of C</p> <p>Preconditions : O has control of the dialogue If D then C is top of the claim stack P has issued a supply warrant (C)</p> <p>Postconditions : P has control of the dialogue</p> <p>Completion Conditions : If D then C is popped from the claim stack</p>	<p>Supply Backing (C) :</p> <p>Description : P says that B is the authority for his argument for C</p> <p>Preconditions : P has control of the dialogue O has issued an on account of (C) P has issued a supply warrant (C) If D then C is top of the claim stack</p> <p>Postconditions : R has control of the dialogue O is committed to If D then C If D then C is popped from the claim stack</p> <p>Completion Conditions : None</p>
<p>Supply Data (C) :</p> <p>Description : P asserts that D and that D supports C</p> <p>Preconditions : P has control of the dialogue O has issued a Why (C) C is top of the claim stack</p> <p>Postconditions : P is committed to D D is pushed on the claim stack O has control of the dialogue</p>	<p>Withdraw (C) :</p> <p>Description : P withdraws his commitment to C</p>

Preconditions :
P has control of the dialogue
C is top of the claim stack

Postconditions :
C is popped from the claim stack
P is not committed to C
R has control of the dialogue

Completion Conditions :
None

Switch Focus (C) :

Description :
O wishes to consider a claim not currently top of the claim stack

Preconditions :
C is not top of claim stack
C is on the claim stack
O has control of the dialogue
O is not committed to C

Postconditions :
C is moved to top of claim stack
O has control of the dialogue

Completion Conditions :
None

Current Claim (C) :

Description :
The referee passes control to the opponent of the current claim

Preconditions :
C is top of the claim stack
Ref has control of the dialogue
Player A is committed to C

Postconditions :
Player B has control of the dialogue

Completion Conditions :
None

End :

Description :
The referee terminates the dialogue

Preconditions :
Ref has control of the dialogue
The claim stack is empty

Postconditions :
The dialogue terminates

Completion Conditions :
none

Rebut (C) :

Description :
Player is invited to rebut an implicit commitment

Preconditions :
Referee has control of the dialogue
C is top of claim stack
Player is not committed to C
Player is not committed to if D then C for some D
Player is committed to D

Postconditions :
Player has control of the dialogue
Player is opponent, other player is proponent

Completion Conditions :
C is not top of claim stack

Rebuttal (C) :

Description :
Player provides a rebuttal, D, of C

Preconditions :
Player has control of the dialogue
Player is not committed to C
Other player is committed to C

Postconditions :
D is pushed onto the claim stack
Player is committed to $\neg C$
Player is committed to D
C is pushed onto claim stack
Player is committed to if D then $\neg C$
If D then $\neg C$ is pushed onto claim stack
Player is proponent, other player is opponent
Opponent has control of the dialogue

Completion Conditions :
 $\neg C$ is no longer on the claim stack

3 CONCLUSION

We have...

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