Beyond Task-Oriented and Chitchat Dialogues : Proactive and Transition-Aware Conversational Agents

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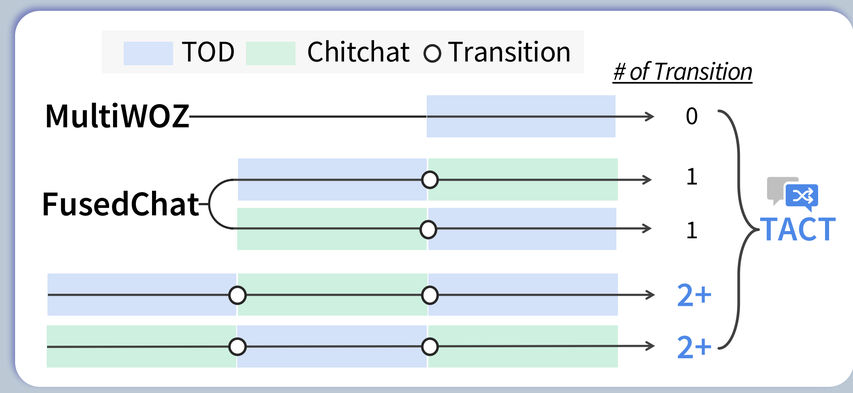
Motivation

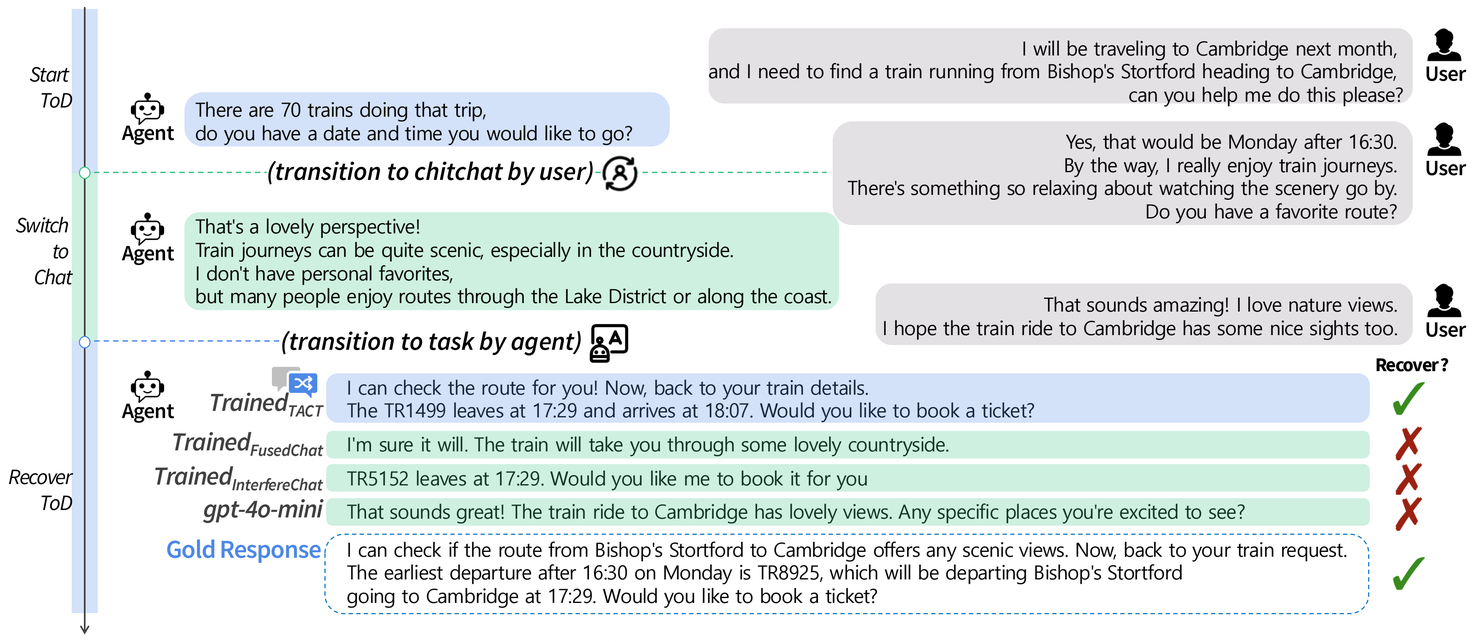
- ***Problem***: Existing attempts to integrate Task-Oriented Dialogue (TOD) and open-domain chitchat suffer from **limited transition diversity** and lack support for **multi-turn**, **recoverable transitions**.
- ***Observation***: Real-world conversations involve **frequent and complex mode switches** (e.g., TOD → Chitchat → TOD) that require both **transition-awareness** and **proactivity**.
- ***Our Contribution***: Introduce **TACT** (TOD-And-Chitchat Transition) — a benchmark for training conversational agents that can handle **natural mode transitions** and recover suspended tasks.



▲ *Comparison of dialogue flows in existing datasets vs. TACT.*

TACT Dataset Designed to equip conversational agents with the ability to handle natural, recoverable mode transitions between TOD and chitchat.

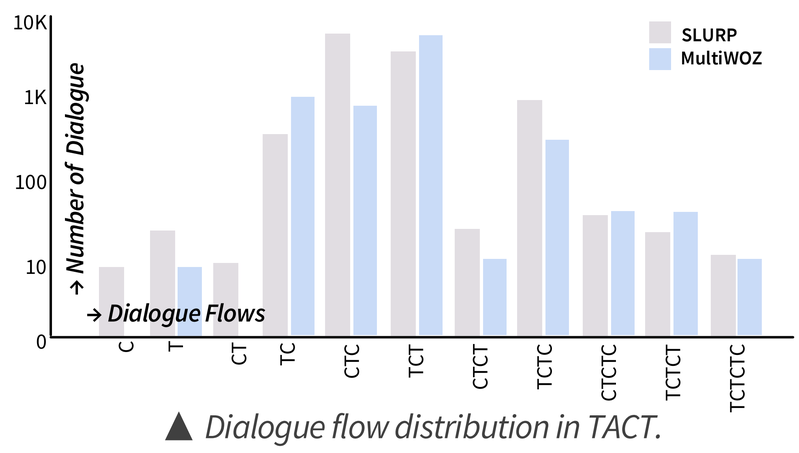
- **Dialogue Construction:**
  - Diverse flow patterns: TCT, CTC, TCTCT, etc., covering both short- and long-horizon transitions.
  - Balanced initiators: Includes both user- and agent-driven mode switches.
  - Recoverable structures: Supports returning to suspended modes, enabling multi-turn coherence.



▲ *Example scenario illustrating transition-awareness and proactivity.*

Dataset	SalesBot2.0	FusedChat	InterfereChat	TACT	
Seed	SalesBot1.0	MultiWOZ2.4	FusedChat	MultiWOZ2.2	SLURP
# Intents	6	11	11	11	50*
# Dialog	5,453	10,436	4,475	7,199	9,936
# Avg. Turn	7.71	18.36	13.58	15.04	16.42
# Avg. Switch	0.96	1	0*	1.93	2.06
# Avg. Recov.	-	0	0*	0.93	1.07
# Uniq. Flow	2	2	1	11	12
Flow Types	CT	TC, CT	T*	TCT, CTC, TCTCT, etc.	

▲ *Statistics of existing datasets and proposed TACT.*



▲ *Dialogue flow distribution in TACT.*

- **Dialogue Validation:** Ensure large-scale data quality while keeping dialogues natural.
  - Criteria: (1) ***Intent accuracy*** (correct task interpretation), (2) ***Transition quality*** (contextually justified switches), (3) ***Dialogue naturalness*** (fluency & coherence)
  - Method: Hybrid validation — human-authored criteria + LLM reasoning

  → ***Improves intent consistency and transition realism across the dataset***

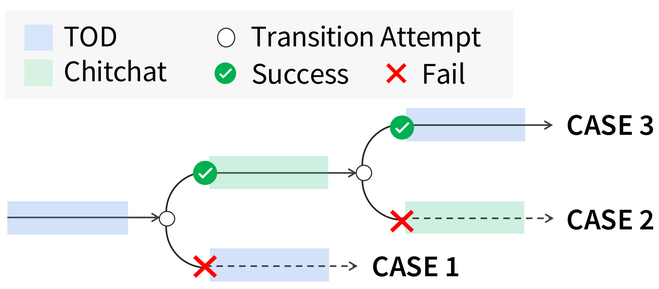
Validation Approaches	Human-Annotated Criteria	LLM-Generated Task Description	LLM-Generated Evaluation Steps
Active Critic	✗	✓	✗
G-Eval	✓	✗	✓
Ours	✓	✓	✓

▲ *Comparison of data validation methods.*

We've developed **TACT**, a dataset built to evaluate and advance transition-aware dialogue systems, reflecting the diversity and naturalness of real conversations, and rigorously validated to ensure intent accuracy, transition quality, and coherence.

Methodology & Metrics

- **Model & Training**
  - *Base*: **FnCTOD** — a unified dialogue model that integrates task execution and chitchat through structured function calls
  - ***Enhancement***: Finetuned on TACT with DPO to improve response quality, flow control, and mode-awareness
- **Evaluation**
  - ***TOD-centric***: Mode Selection, Intent Detection, Joint Accuracy
  - ***Chitchat quality***: SSI $_{\text{Sensibleness, Specificity, Interestingness}}$, Transition Naturalness
  - ***Transition-aware***: **Switch** & **Recovery** (measured by attempts & successes)



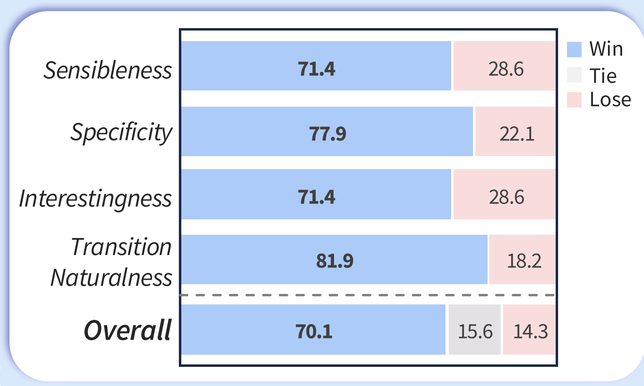
CASE 3	Attempt	Success
Switch	+2	+2
Recovery	+1	+1
CASE 2	**Attempt**	**Success**
Switch	+2	+1
Recovery	+1	X
CASE 1	**Attempt**	**Success**
Switch	+1	X
Recovery	-	-

▲ *Visualization of Switch & Recover metrics.*

Key Results

Method	TOD: Mode Selection Acc.	TOD: Mode Selection F1-score	TOD: Intent Detection Acc./turn	TOD: Intent Detection Acc./dialogue	Flow: Switch Attempt	Flow: Switch Success	Flow: Recovery Attempt	Flow: Recovery Success	Chitchat: Overall Win-Rate
ICL-ZS	90.46	86.21	87.57	50.44	0.879	0.374	0.880	0.099	-
ICL-FS	91.45	88.98	84.09	40.00	**1.577**	0.865	**1.571**	0.652	-
SFT	**98.95**	**98.50**	**96.35**	**80.94**	1.322	1.300	0.977	0.856	23.16
SFT-DPO	98.82	98.32	96.03	80.00	1.343	**1.322**	0.977	**0.859**	**40.86**
Pipeline	**98.95**	**98.50**	**96.35**	**80.94**	1.322	1.300	0.977	0.856	24.32

- ***TACT-trained***: Only models achieving non-zero transition success in multi-turn settings
- ***DPO Gains***: +40.86% win rate, +33.7% in transition naturalness vs. GPT-4o
- ***Flow Sensitivity***: Strongest on TCT; CTC/TC remain challenging



▲ *Win-rate comparison (GPT-4o vs. DPO)*

* ***Insights***: Preference tuning yields smoother, contextually grounded transitions