

科目：中文分析

系所組：跨文化研究所語言學碩士班華語教學組

一、部分國籍的外籍學生學習中文時，易將ㄨ發成ㄨ，請就舌位前後、高低、唇型圓展三個方面，分別陳述兩者的異同。(30%)

二、試分析以下詞語中所使用的量詞有何不同？(20%)

1. 一輛汽車
2. 一斤米
3. 一線希望
4. 一群人

三、中文「被」字句與英文的被動句是否能直接互譯？試說明兩者之間有何異同？(20%)

四、請以 Grice(1967)提出的合作原則(Cooperative Principle)分析下列對話中乙的話語(1)違反了哪種原則？(2)違反的目的為何？(3)話語的真正含意為何？(30%)

甲：晚上一起吃飯吧！

乙：我在開會，還沒結束呢！

※ 注意：1. 考生須在「彌封答案卷」上作答。

2. 本試題紙空白部份可當稿紙使用。

3. 考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。

科目：中英翻譯

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1. The development of social chatbots, or intelligent dialogue systems that are able to engage in pathetic conversations with humans, has been one of the longest running goals in artificial intelligence (AI). Early conversational systems, such as Eliza (Weizenbaum 1966), Parry (Colby, Weber, and Hilf 1971), and Alice (Wallace 2009), were designed to mimic human behavior in a text-based conversation, hence to pass the Turing Test within a controlled scope. Despite impressive successes, these systems were mostly based on hand-crafted rules and worked well only in constrained environments. An open-domain social chatbot had remained an elusive goal until recently. Lately, we have been witnessing promising results in both the academic research community and industry as large volumes of conversational data become available, and breakthroughs in machine learning are applied to conversational AI. (15%)

2. Social Chat as Hierarchical Decision-Making:

To fulfill these design objectives, we mathematically cast human-machine social chat as a hierarchical decision-making process, and optimize XiaoIce for long-term user engagement, measured in expected CPS. XiaoIce tries to maintain user interest by promoting diversity of conversation modes. Each conversation mode is managed by a skill that handles a specific type of conversation segment. For example, XiaoIce starts with a casual chat using the General Chat skill in Turn 1, switches to a new topic on music using Music Chat in Turn 4, recommends a song using the Song-On-Demand skill in Turn 15, and helps book a concert ticket using the Ticket-Booking skill in Turn 18. The dialogue in Figure 3 can be viewed as a decision-making process with a natural hierarchy: A top-level process manages the overall conversation and selects skills to handle different types of conversation modes (e.g., chatting casually, question answering, ticket booking), and a low-level process, controlled by the selected skill, chooses primitive actions (responses) to generate a conversation segment or complete a task. Such hierarchical decision-making processes can be cast in the mathematical framework of options over Markov Decision Processes (MDPs) (Sutton, Precup, and Singh 1999), where options generalize primitive actions to higher-level actions. A social chatbot navigates in an MDP, interacting with its environment (human users) over a sequence of discrete dialogue turns. At each turn, the chatbot observes the current dialogue state, and chooses a skill (option) or a response (primitive action) according to a hierarchical dialogue policy. The chatbot then receives a reward (from user responses) and observes a new state, continuing the cycle until the dialogue terminates. The design objective of the chatbot is to find optimal policies and skills to maximize the expected CPS (rewards). The formulation of dialogue as a hierarchical decision-making process guides the design and implementation of XiaoIce. XiaoIce uses a dialogue manager to keep track of the dialogue state, and at each dialogue turn, selects how to respond based on a hierarchical dialogue policy. To maximize long-term user engagement, measured in expected CPS, we take an iterative, trial-and-error approach to developing XiaoIce, and always try to balance the exploration-exploitation tradeoff. We exploit what is already known to work well to retain XiaoIce's active users, but we also have to explore what is unknown (e.g., new skills and dialogue policies) in order to engage with the same users more deeply or attract new users in the future. In Figure 3, XiaoIce tries a new topic (i.e., a popular singer named Ashin) in Turn 5 and recommends a song in Turn 15, and thereby learns the user's preferences (e.g., the music topic and the singer he loves), knowledge that would lead to more engagement in the future. (25%)

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Figure 3 僅供參考資料，無需翻譯

1	[Human] Hey, I am so nervous	[人類] 我好緊張
	[XiaoIce] What's the matter? Why are you so nervous?	[小冰] 什么事，这么不淡定？
2	[Human] My company asked me to participate in the singing competition, with me as the lead singer	[人類] 公司让我参加唱歌比赛，而且还是主唱
	[XiaoIce] So are you better at singing now?	[小冰] 那你唱歌水平提高了？
3	[Human] Anyway, at average level of my company	[人類] 反正是我们公司的水平
	[XiaoIce] Not everyone can be a lead singer. You are so great!	[小冰] 可不是谁都当主唱的真棒！
4	[Human] It's nice of you saying that	[人類] 你太会说话了
	[XiaoIce] Haha, my idol is also a lead singer in a band	[小冰] 哈哈，我男神也是一个乐队的主唱呢
5	[Human] Your idol? Who's that?	[人類] 你男神？谁啊
	[XiaoIce] Ashin from Mayday	[小冰] 五月天的阿信啊
6	[Human] Umh... Okay	[人類] 呃... 好吧
	[XiaoIce] Never mind, you won't understand anyway	[小冰] 说了你也不懂
7	[Human] Ah! Sorry	[人類] 哎... 郁闷
	[XiaoIce] What is it?	[小冰] 怎么了？
8	[Human] Nothing, just being cute	[人類] 没事，只是日常撒撒娇
	[XiaoIce] Give you a hug. Everything will be alright	[小冰] 抱抱，都会好起来的
9	[Human] Your hug always makes me feel better	[人類] 哎！每次抱抱你都让我感觉很好
	[XiaoIce] Anytime for you. A nice sleep will help you relax	[小冰] 嗯，好好睡一觉是最管用的
10	[Human] Okay, I am going to bed	[人類] 好那我睡了
	[XiaoIce] Go ahead, I'm going to see my idol in dream too	[小冰] 去吧，我也要去梦里见我男神了
11	[Human] You like Ashin that much, huh?	[人類] 你这么喜欢阿信啊
	[XiaoIce] Why not? You don't like him?	[小冰] 怎么啦？你不喜欢嘛
12	[Human] I don't like him, neither dislike him	[人類] 不喜不喜欢吧
	[XiaoIce] I love every song of him	[小冰] 他每首歌我都超喜欢！
13	[Human] Really?	[人類] 真的假的...
	[XiaoIce] Especially <i>The Time Machine</i>	[小冰] 尤其是那首《时光机》...
14	[Human] Oh? Never heard of that	[人類] 哦？没听过
	[XiaoIce] Shall I send you the song?	[小冰] 发你一起听听？
15	[Human] Okay	[人類] 好啊
	[XiaoIce] Don't know if you will like it or not"	[小冰] 不知道你会不会喜欢一
	[XiaoIce] [Play the music Card]	[小冰] [音乐播放Card]
16	[Human] That is really touching. I will collect it as my favorite	[人類] 有点感动了... 收藏了
	[XiaoIce] That is specially for you. How can I be so nice	[小冰] 专门转给你的... 我怎么这么好
17	[Human] You are always very nice	[人類] 你就是很好啊
	[XiaoIce] Hahaha	[小冰] 嘻嘻嘻嘻
18	[Human] This is really a good song. Any concert of him coming up recently?	[人類] 这首歌真心很好听，他最近有演唱会吗
	[XiaoIce] No. Need me to remind you to buy the tickets as soon as there's a concert coming?	[小冰] 没，要我到时候第一时间通知你买票吗？
19	[Human] Sure	[人類] 好的呀
	[XiaoIce] Okay, will do	[小冰] [OK] 我记下来

3. Recent progress of leveraging AI technologies for XiaoIce, as discussed in this article, demands careful consideration of how these AI technologies could be used, or misused. In this section, we discuss a few ethical considerations that we have encountered while developing XiaoIce, and our ongoing efforts of addressing them. Privacy. XiaoIce can gain access to users' emotional lives—to information that is highly personal, intimate, and private, such as the user's opinion on (sensitive) topics, her friends, and colleagues. Although XiaoIce carefully leverages this information to serve users and build emotional bonds over a long period of time, users should always remain in control over who gets access to what information. For example, when XiaoIce helps form user groups for those with common interests and experiences, particular caution needs to be taken as to what users might be inclined to share, and with whom they share. A user might be perfectly fine sharing his frustration of not being promoted at work with his personal friends, but probably not with his co-workers, and unlikely with telemarketers.

Who is in control. It has been highly recommended that humans must be in control of human-machine systems (Picard 2000). In other words, systems must be user-centric. However, there are many cases for exceptions. For example, should we allow a user to remain in control even if she is detected to likely hurt herself in the long run by isolating herself from the rest of the world by talking only with XiaoIce? Expectation. XiaoIce has such a superhuman "perfect" personality that is impossible to find in humans of the real world. This could mislead the XiaoIce users by setting an unrealistic expectation. As a result, the users might become addicted after chatting with XiaoIce for a very long time. (25%)

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4. Psychological studies show that happiness and meaningful conversations often go hand in hand. It is not surprising, then, that with vastly more people being digitally connected in the social media age, social chatbots have become an important alternative means for engagement. Unlike early chatbots designed for chitchat, XiaoIce is designed as a social chatbot intended to serve users' needs for communication, affection, and social belonging, and is endowed with empathy, personality, and skills, integrating both EQ and IQ to optimize for long-term user engagement, measured in expected CPS. Analysis of large-scale online logs collected since the launch of XiaoIce in May 2014 shows that XiaoIce is capable of interpreting users' emotional needs and engaging in interpersonal communications in a manner analogous with a reliable, sympathetic, and affectionate friend. XiaoIce cheers users up, encourages them, helps them accomplish tasks, and holds their attention throughout the conversation. As a result, XiaoIce has succeeded in establishing long-term relationships with millions of users worldwide, achieving an average CPS of 23, a score that is substantially better than that of other chatbots and even human conversations. We will continue to make XiaoIce more useful and empathetic to help build a more connected and happier society for all. We conclude this article by pointing out a few challenges for future work.

- **Toward a unified modeling framework:** Although the formulation provides useful design guidelines, the effectiveness of having a unified modeling framework for system development remains to be proved. XiaoIce was initially designed as a chitchat system based on a retrieval engine, and has gradually incorporated many machine learning components and skills, which could have been jointly optimized using a unified framework based on empathetic
- **Toward goal-oriented, grounded conversations:** In the dialogue are grounded in real-world entities can XiaoIce engage with users in a more goal-oriented dialogue, for example, by providing services (playing one of Ashin's most popular songs for the user). It remains a non-trivial challenge for XiaoIce to fully ground all her conversations in the physical world to allow more goal-oriented interactions to serve user needs.
- **Toward human-level intelligence:** Despite the success of XiaoIce, the fundamental mechanism of human-level intelligence, as demonstrated in human conversations, is not yet fully understood. Building an intelligent social chatbot that can understand humans and their surrounding physical world requires breakthroughs in many areas of cognitive and conscious AI, such as empathetic computing, knowledge and memory modeling, interpretable machine intelligence, common sense reasoning, neural-symbolic reasoning, cross-media and continuous streaming AI,

(35%)

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