

### 智能时代人机交互的一些思考

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 $Fan\ J\ J,\ Tian\ F,\ Du\ Y,\ et\ al.\ Thoughts\ on\ human-computer\ interaction\ in\ the\ age\ of\ artificial\ intelligence\ (in\ Chinese).$ 

 $\mathbf{2}$ Licklider <sup>[2]</sup> 1960 (man-computer symbiosis) . 1992 (association for computing nachinery, ACM) (special interest group on computer-human interaction, SIGCHI) [3]. 1999 21 . 2007 (national science foundation, NSF) (information and intelligent systems, IIS) 7 2012 , ACM . 2016 1980 74 2014 11165 1). 100 25 Massachusetts Institute of Technology Carnegie Mellon University Stanford University Microsoft Google Bill Gates " 20 [4].

1) http://www.hcibib.org/.

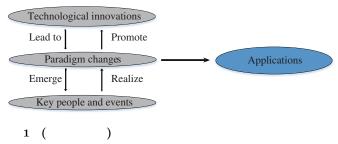
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. 1945 , Bush  $^{[5]}$  Memex,

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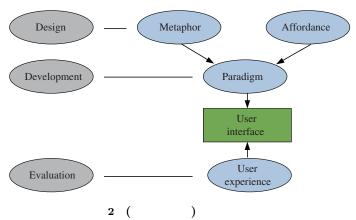
 $\mathbf{Fig} \quad e \ \mathbf{1} \quad \text{(Color online) Relationship among the innovation of technology, the change of paradigm, and key people and events}$ 

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Post-WIMP <sup>[11]</sup>
                                                                                                                 Non-
\mathrm{WIMP}^{\;[12]}
                            (physical object, icon, button, gesture) [13],
              PIBG
      (tangible user interface) [14],
                                                                                    (radical atom) <sup>[15]</sup>
3.2
                                                                                               [16]
                                               , Card
              (the model human processor, MHP)
                                                           GOMS (goals, operations, methods, selection rules)
     . MHP
                                                              . GOMS
                                                                   , GOMS
                                         , GOMS
                                                                            (task-action\ grammar,\ TAG)
      GOMS
                              <sup>[18]</sup>. SOAR
           <sup>[19]</sup>. ACT-R
                                                          [20]
                                                                                                     <sup>[21]</sup>. EPIC
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[22]. MHP, GOMS, SOAR, ACT-R, EPIC 3.3 (user interface, UI) [23] 3 (batch interface, BI) (graphical user interface, GUI). BI (command line interface, CLI)  $\operatorname{CLI}$ GUI . GUI , GUI NUI (natural user interface, NUI) (metaphor) (affordance) (paradigm) (user experience) 4 2 WIMP WIMP [24, 25][26] [27][28][29].

:



 $\mathbf{Fig} \quad \mathbf{e} \ \mathbf{2} \quad \text{(Color online) User interface framework}$ 

[30]. [31] . Norman Fitts  $^{[32,33]}$  Hick [34] 7 2 [35] 3.4 , Nickerson , Ritter  $^{[36]}$ ABCS (anthropometrics, behavior, cognition, social factors) .  $\operatorname{ABCS}$ ABCS  $\operatorname{ABCS}$ [37]

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Norman

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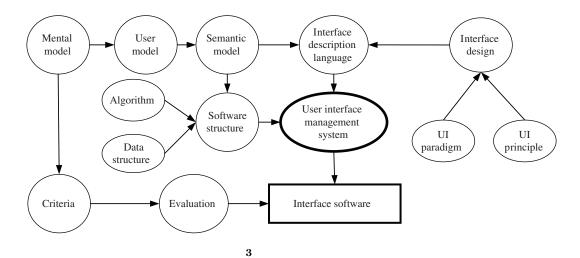


Fig e 3 HCI research framework

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, [40].

, Mann  $^{[41]}$ 20 90  $\operatorname{CLI}$  $\operatorname{GUI}$ ". 2008 , Microsoft  ${\rm NUI}$  $\operatorname{CLI}$  $\operatorname{GUI}$ August Wixon  $^{[40]}$ , Wigdor . 2010 [42] Jefferson Han Perceptive Pixel  ${\bf Microsoft}$  ${\bf Pixel Sense}$ Xbox Kinect Edusim 3D Immersive Touch  ${\bf Thalmic}$ Labs MYO 4.2 (reality-based interaction, RBI) <sup>[43]</sup>. RBI RBI [11]. 2 3 . RBI . Flying Kite RBIRBI[44]. 4.32013

, (technology-mediated social participation, TMSP) . TMSP

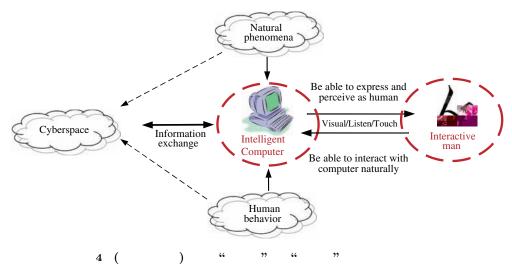
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[45].  ${\bf Shneiderman}$ 4.4 MHP [47, 48](practice-oriented approaches, POA) . Shove POA 3  $[50 \sim 55]$ . POA 4.5(cyber-human system, CHS)  $^{[56]}$  $\operatorname{CHS}$ 5 1997 3 AlphaGo , Google 369

[57, 58]**5.1** [3]. [59]. 5.2[60] (HCI), (human-centered computing, (CHS). HCC), , Licklider  $^{[2]}$ 1960

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5.3

, Michael Jordan ,

. Apple

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# Thoughts on human-computer interaction in the age of artificial intelligence

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Abstract With the rapid development of information technology, the extensive development of artificial intelligence and its successful applications in several industries have given rise to great imaginations of providing computer services to human beings once again. However, as the interface of information communication between humans and computers-human-computer interaction-has not been properly developed, the resulting bottleneck effect has become increasingly evident. The reasons for this can be summarized as follows: (1) lack of learning history of the development experience; and (2) changes in the application scenarios in the age of artificial intelligence result in new demands, which presents a huge challenge to human-computer interaction. This paper presents a review of the history of the development of human-computer interaction, focuses on the core issues of human-computer interaction, and summarizes the important theory of thoughts. Lastly, we present some necessary discussions and reflections on the future development of human-computer interaction.

 $\textbf{Keywords} \quad \text{human-computer interaction, user interface, mental model, research framework, artificial intelligence} \quad \textbf{Mean-computer interaction}, \textbf{M$ 



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