

Joint Use of Information Technologies: Why not Agree and Shop Online Together?

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Abstract

In the Information Systems (IS) domain, there's a gap in understanding how two individuals may use information technology (IT) resources in tandem, termed "joint IT use". Our dyadic joint IT use model predicts that dyadic conflict and its dimensions — cognitive, emotional, and behavioral — during IT use performed jointly, influence user intention to continue with joint IT use, relationships mediated by the consensus-building effort and time. This dyadic conflict is also the key mediator for external factors including initial agreement, user input device control, and shared system display. A role-based experiment in online shopping settings validates our research model, offering fresh perspectives and guiding IT experts in future research and system design, especially in enhancing shared interfaces, input control management, and initial consensus.

Keywords: joint IT use, dyadic processes, multiuser human-computer interaction, conflict, online shopping in couple.

1. Introduction

This paper examines the phenomenon of user dyads interacting together and simultaneously with the same information technology (IT) interface, which we refer to as joint IT use. Research suggests that this phenomenon is seldom investigated, though common in organizational and hedonic settings (Tchanou et al., 2020a). A common way individuals use IT is by interacting with a single system interface collaboratively with another user (Burton-Jones and Gallivan, 2007) both in business contexts (e.g., two workers building a slideshow document together) and in hedonic settings (e.g., a couple shopping online together) (Burton-Jones and Gallivan, 2007). Literature suggests that related scenarios include *single interface physically shared* (e.g., sharing a computer, Mekki Berrada, 2011) and *single interface*

physically separate, with single or dual-user screen control, with synchronous use or not (e.g., Stewart et al., 1999). In such context, user adaptation can be influenced by how two users cope as a dyad with IS-related events, which may originate not only directly from technology (e.g., a system failure or unexpected behavior) but also from collaboration among the users during system use (e.g., a clash over decision making). Clearly, the joint IT use perspective in IT use studies could complement understanding of IT use (e.g., a detrimental action from user's partner during dyad system use may influence direct user-system interactions). Understanding dyadic dynamics when two users interact together with a system interface may help identify conditions favoring IT use performance and, in turn, IS success. For example, recent research work shows that user dyad gaze convergence (i.e., the extent to which a user dyad's members look at same locations on the screen (Tchanou et al., 2020b)) during users' simultaneous interaction with an IT interface may favor lower cognitive load and better dyadic performance. Moreover, a better understanding of the aforementioned dyadic dynamics may help improve system design by promoting system features favoring dyadic IT use mechanisms associated with performance. Hence, it is important to identify such system features, at least at a general level, to provide useful practical guidance to IT system design industry.

However, IT use literature seldom addresses joint IT use by multiple users. Little is known about joint IT use mechanisms, that is, configurations of collaborative use-related factors occurring together (Meyer et al., 1993). Moreover, IT use research has been heavily focused on the planned behavior and reasoned action paradigm (Venkatesh et al., 2016) and lacks insights about mechanisms occurring during IT use, in individual and multiuser contexts.

We address these shortcomings by conceptualizing joint IT use mechanism as a group-level construct encompassing configurations of emotions, cognitions, and behaviors happening during joint IT use. We focus on user dyads (i.e., two users)

interacting interdependently with a system interface to perform a task. Moreover, as literature suggests that different system settings (e.g., using a mobile phone or a tablet, display sharing, or input device control) are significantly employed for joint use activities (e.g., Tchanou et al., 2020a), we investigate the influence of such settings on joint IT use mechanisms. Besides, drawing from literature suggesting influence of group-level characteristics on group processes (Maynard et al., 2015), we examine the influence of dyad-level initial states such as dyad agreement prior to IT task, on joint IT use. Hence our research questions (RQ):

RQ1: What are emerging constructs underlying joint IT use, their relationships, and their impact?

RQ2: What is the influence of display sharing and input device control on joint IT use?

RQ3: What initial dyad states influence joint IT use?

The present paper addresses these questions using Activity theory and literature on IS continuance and dyadic processes. Based on the research framework of our study, we develop a model of joint IT use in the context of joint online shopping by couples. To test our hypotheses, we ran an online experiment through which we captured joint IT use mechanisms. Our results suggest influence of system setting and dyad pre-agreement state on joint IT use mechanisms, which fully mediate influence of the former on behavioral intention to continue joint IT use.

This paper contributes in different ways to the literature. Our conceptualization of joint IT use mechanisms reflects how IT systems are commonly used in hedonic and utilitarian contexts. Through this perspective, we help explain how collaboration dynamics emerging from joint interactions by a user dyad with system interface may influence individual behavioral outcome. In doing so, our research also provides practical suggestions for system designers to consider the implementation of system features that promote better joint IT use performance.

In the remainder of this paper, we first present theoretical ground that helps explain the phenomenon of study. Second, we present our research framework. Third, we develop hypotheses explaining how system settings and dyad initial state influence individual behavioral outcome. Fourth, we present our study methodology, followed by a concluding discussion.

2. Theoretical background

2.1. Activity theory

Activity theory's mediation principle proposes that human experiences are shaped (or mediated) by the tools and sign systems we use (Nardi, 1996). Hence, the theory suggests that people's emotional and

cognitive experience can be only analyzed in association with their activities, that is, while they perform actions (Kaptelinin, 1996). The theory also suggests that analysis at the very individual unit of analysis is insufficient. Instead, the theory proposes activity system, which includes collective human activity, as unit of analysis (Engeström et al., 1999). Regarding the application of Activity theory to the IS field, to better understand IT use phenomenon, we need to consider not only individuals' interactions with an IT, but also their behaviors related to system use (Barki et al., 2007), including collaboration with other users in the system use process.

This study is in line with Activity theory's recommendations: we examine joint IT use in terms of mechanisms taking place while a dyad of users jointly use a system interface. Moreover, as recommended by the theory, we investigate joint IT use not simply at individual level, but at dyad level, in line with calls for the conceptualization of IT use as a multilevel construct (e.g., Burton-Jones and Gallivan, 2007).

2.2. Model of IS continuance (MISC)

The post-acceptance MISC, based on Expectation-Confirmation Theory in the IS field, was proposed by Bhattacharjee (2001) to address cognitive beliefs and affect that are antecedent to people's intention to continue using an IT, a construct referred to as IT continuance intention. The model addresses three factors of IT continuance intention: confirmation of user's expectations towards IT use, perceived usefulness following user experience with IT, and satisfaction with IT use. The model considers satisfaction an ex post feeling resulting from users' ex ante expectations or cognitive beliefs, that is, those before the use of IT. The model stipulates that confirmation increases perceived usefulness, each of these two constructs being positively associated with satisfaction with IT use. It also suggests that satisfaction and perceived usefulness positively influence IT continuance intention. Perceived usefulness is addressed as a cognition, and satisfaction is addressed as an emotion. Consistent with the nature of these factors, along with behavioral constructs, the present study proposes cognitive and emotional constructs as antecedents of IT continuance intention resulting from joint IT use.

2.3. Dyadic processes and emerging states

Research addresses the concept of dyad as a particular case of group on its own right and the most elementary form of group (Miller, 2007). In this study, we define a user dyad as a group of two users jointly

interacting with a system interface interdependently and sharing ideas, information and resources in order to add together their efforts to achieve common goals. This definition is very much similar to that of an elementary instance of team as defined in the group dynamics literature (e.g., Whitley, 2018).

Research suggests that dyadic processes are similar to group processes (e.g., Korsgaard et al., 2008). Hence, it is reasonable to expect that dyads working together experience the different types of group processes. We use the taxonomy of team processes proposed by Marks et al. (2001) to categorize dyadic processes into three types. The first type is transition dyadic processes during which dyads engage in such task-related activities as formulating strategies, specifying goals to achieve, and planning task accomplishment (Tsai et al., 2023; Maynard et al., 2015). The second type is action dyadic processes consisting of such activities as addressing task accomplishment, coordinating dyad interdependent actions, and monitoring progress toward goals. The third type is interpersonal dyadic processes composed of such activities as managing conflicts, managing dyad members' affect, and building collective motivation and confidence (Dennis et al., 2023). These dyadic processes are dynamic interactions between dyad members happening when they perform a task together (Maynard et al., 2015). These processes generate emerging states, that is, affective, motivational, and cognitive states of dyads (Marks et al., 2001; Maynard et al., 2015). Emerging states include constructs such as dyadic conflict, dyad agreement, dyad effectiveness, dyad members' intention to continue to collaborate together, and dyad performance. In this paper, we adopt a variance approach and focus on dyad emerging states rather than on the dynamic dyad process leading to them.

2.4. Research framework

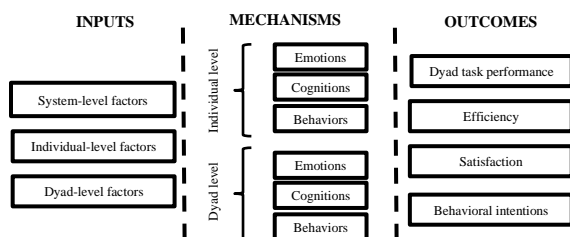


Figure 1. The study's research framework.

In this study, we investigate how initial conditions (i.e., conditions in which a user dyad engages in joint IT use) are related to outcomes through mediating mechanisms including dyad emotions, cognitions, and behaviors. Hence, our research framework includes

three layers as depicted in Figure 1. The mediation layer represents mechanisms that manifest during joint IT use at individual or dyad level and that influence use outcomes. We address these mechanisms as emergent states at dyad level. IT use mechanisms have been investigated in three dimensions in the literature: as cognitions, that is, user thinking and memory load; as affect, that is, user emotions related to system use (e.g., De Guinea and Webster, 2013); and as behaviors, that is, actions a user takes. Moreover, collaborative IT use has been conceptualized as an aggregation of individual use constructs (e.g., Easley et al., 2003) or as configurations of cognitions, emotions, and behaviors emerging in a collective of users (Burton-Jones and Gallivan 2007).

3. Hypothesis development

In this section, we draw from the research framework in Figure 1, in the specific context of joint e-commerce system use by couples, a phenomenon acknowledged as important and deserving attention. A recent study suggests that about 94% of couples in the U.S.A. jointly shop online using a single computer at least occasionally, among them 74% sometimes or frequently doing so (Tchanou et al., 2020a). Couples' online shopping illustrates how couples – a particular case of dyad – jointly use interfaces, involving standard dyadic processes such as goal definition, agreement, negotiation, conflict management, action coordination, and motivation building.

3.1. Dyadic conflict

The central construct in this paper is dyadic conflict. Conflict has been addressed as a state (Hu et al., 2017; Anicich et al., 2016) – this perspective is the focus of the present paper. Moreover, conflict has been increasingly suggested as an important perspective for studying group dynamics (e.g., Ma et al., 2017). Past research proposes a four dimensions conceptualization of conflict (e.g., Ma et al., 2017). First, cognitive conflict refers to expressions of divergence in thoughts and opinions. Second, affective conflict refers to expressions of negative emotions. Third, interest-based conflict refers to clashes resulting from personal interest, such as claims to power, reward, and resources. Finally, behavioral conflict refers to destructive interactions such as being unsupportive and interfering with each other's action. In this paper, we draw from Ma et al. (2017)'s work to define dyadic conflict as dyad state emerging from incompatible expressions between dyad members, made of the above-mentioned four dimensions.

3.2. Input layer's influences

Based on above view of conflict, it is clearly expected that dyadic joint IT use by nature is prone to the appearance of dyadic conflict, as the two users share the same system interface and the same hardware (e.g., screen, mouse, keyboard, or touchpad). Moreover, conflict may result from dyad structure, including differences in dyad members' roles during the task, such as input devices control (i.e., who controls the mouse, keyboard, or touchpad). Research suggests that when two users share a same interface display, they tend to clash over input device control, with the user not controlling input devices usually pointing at the screen, claiming control, and getting bored with his or her role, leading to a deteriorating collaboration (Mekki Berrada, 2011). Actually, it is important for individuals to feel in control of their environment for their wellbeing (Bandura, 1989) and motivation (Underwood, 2000). Hence, during joint e-commerce system use by couples, we expect higher dyadic conflict when only one partner controls the input devices in a shared system display setup, compared to when each partner controls his/her own mouse in a separate system displays setup (i.e., setup in which partners interact interdependently, each with a different system interface display). Besides, research suggests that dyadic conflict involves differences in opinions expressed through arguments and is prone to manifestation of negative emotions and destructive behaviors from dyad members (Ma et al., 2017; Barki and Hartwick, 2004). Clearly, higher dyadic conflict involves higher cognitive, affective, and behavioral conflict. We herein call controlling user the user with input device control. Hence, the following hypotheses.

H1: *Shared system display setting will generate (a) higher overall dyadic conflict, (b) higher cognitive conflict, (c) higher affective conflict, and (d) higher behavioral conflict than separate system displays.*

Dyadic conflict can be perceived differently by each of the two parties. Literature on intragroup conflict suggests that in a dyadic relationship, power asymmetry exacerbates conflict between dyad members, and that the dyad member with less power is more likely than the other one with more power to perceive dyadic conflict (Korsgaard et al., 2008). Hence, during joint e-commerce system use by couples in a shared display setting, the noncontrolling user is likely to perceive higher dyadic conflict than the controlling user because of the former's dependency over the latter. Moreover, perceived dyadic conflict by the noncontrolling user is likely to be higher in this setting than in a separate system displays setup granting each user control over his or her own input devices. Hence the next hypotheses.

H2: *In shared system display setting, (a) overall dyadic conflict, (b) cognitive conflict, (c) affective conflict, and (d) behavioral conflict as perceived by noncontrolling users will be higher than that perceived by controlling users.*

H3: *(a) Overall dyadic conflict, (b) cognitive conflict, (c) affective conflict, and (d) behavioral conflict as perceived by noncontrolling users will be higher in shared system display setting than in separate system displays setting.*

According to Barki and Hartwick (2004), three constructs are associated with conflict, namely, disagreement, negative emotion, and interference, the latter two resulting from conflict, while disagreement is an antecedent of conflict. Generally, major works in the topic suggest that conflict reflects or results from perceived disagreement about (or difference in) opinions, viewpoints, perspectives, and decision making (e.g., Hu et al., 2017; Anicich et al., 2016). In the present work, we focus on pre-task agreement, defined as the extent of settlement happening prior to the joint activity by couples. Hence, this hypothesis.

H4: *Pre-task agreement will negatively influence (a) overall dyadic conflict, (b) cognitive conflict, (c) affective conflict, and (d) behavioral conflict, respectively.*

3.3. Mechanisms and consequences

Conflict is expressed through activities such as discussion, argumentation, and hostile attitudes (Ma et al., 2017). Thus, when couples face conflict, they are likely to engage into extra discussions and arguments aiming at settling the conflict and moving on with task performance – which involves spending additional time on these conflict settlement activities. Besides, research suggests that there is a cognitive cost in engaging into an argument, since it involves a certain degree of cognitive effort (Eemeren and Garssen, 2012). Moreover, consistent with Bhattacharjee (2001)'s model of IS continuance, dyadic conflict is likely to hinder users' intention to continue joint e-commerce system use. Hence, further hypotheses. The research model is presented in Figure 2.

H5: *Overall dyadic conflict, (b) cognitive conflict, (c) affective conflict, and (d) behavioral conflict will respectively be positively related to effort for final consensus.*

H6: *(a) Overall dyadic conflict, (b) cognitive conflict, (c) affective conflict, and (d) behavioral conflict will respectively be positively related to time frame for final consensus.*

H7: *(a) Overall dyadic conflict, (b) cognitive conflict, (c) affective conflict, and (d) behavioral*

conflict will respectively negatively influence intention to continue joint IT use.

H8: Time frame for final consensus will be negatively related to intention to continue joint IT use.

H9: Effort for final consensus will be negatively related to intention to continue joint IT use.

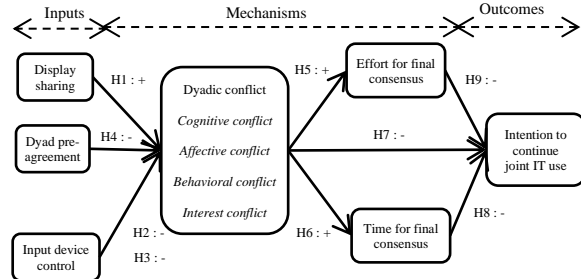


Figure 2. The research model.

4. Methodology

To test our hypotheses, we conducted a scenario-based role-playing experiment (Rungtusanatham et al., 2011). Our study was approved by the ethics committee of our institution. We ran the study through Amazon Mechanical Turk (MTurk), an online crowd sourcing platform commonly used in management research and the most used online crowdsourcing platform (Aguinis et al., 2021). The experiment typically involved participants reporting about their anticipated joint e-commerce system use experience in couple in one specific scenario to which they were assigned. Their reported experience was based on anticipated proceedings of couple's joint system use.

4.1. Study sample

Our sample frame was MTurk's U.S.A. base of about 85 000 people (Robinson et al., 2019). To participate to the study, participants were required to be at least 18-year old, to be in couple whatever their marital status, and to hold an excellent record of quality participation to MTurk studies, with a 90% human intelligence task approval (i.e., previous high-quality performance) (Goodman et al., 2013). Moreover, we made sure that participants could participate only once in the study. No requirements were enforced in terms of gender, education, and any other individual characteristics. Participants received a compensation based on a rate of 10.80 USD per hour. We also included attention check questions among questionnaire items to control for participants' attention during the study. Doing so was in line with past studies suggesting that adding attention check question in MTurk questionnaires helps in significantly improving statistical power and reducing

the probability of making Type II errors (e.g., Goodman et al., 2013).

A total of 521 persons participated in the study. However, we excluded from our sample all participants who reported not being in a relationship, failed at an attention check question, completed the study's questionnaire more than once, or partly completed the questionnaire. Our final sample size was a total of 227 participants 59.47% of them males and 40.53% females. Table 1 shows demographic characteristics of our final sample. A t-test revealed non-statistically significant difference between the final sample and the excluded sample of complete responses, in terms of demographics.

		Frequency	Percentage
Age	< 18	0	0%
	18 - 25	24	10.6%
	26 - 35	117	51.5%
	36 - 45	47	20.7%
	46 - 55	24	10.6%
	>55	15	6.6%
Gender	Man	135	59.5%
	Woman	92	40.5%
	Non-binary/Agender/Other	0	0%
Household income	< \$30,000	27	11.9%
	\$30,000 - \$59,999	72	31.7%
	\$60,000 - \$89,000	58	25.6%
	\$90,000 - \$119,999	40	17.6%
	\$120,000 - \$149,000	17	7.5%
	>= \$150,000	13	5.7%

Note. Household income figures are in USD.

Table 1. Demographics of the final sample.

4.2. Experimental design

Participants were each randomly assigned to one experimental condition in which they were asked to imagine their experience with their partner and picture themselves in a scenario describing their couple's joint online shopping. Each scenario highlighted settings in which the couple shop together, including initial agreement condition between the two partners, system setup, and role played by the participant. Hence, each scenario depicted the couple shopping together as follows. First, either the couple makes a preliminary agreement about what product features to look for, or no preliminary agreement is made (i.e., pre-agreement vs no pre-agreement). Second, the couple shops together using either the same laptop or separate laptops (i.e., shared display vs separate displays). Finally, during the shopping activity, either the participant alone controls, or his or her partner alone controls, or both partners control input devices (i.e., mouse, keyboard, and touchpad). Thus, the shared display condition was equivalent to the combination of the two conditions in which one of the two partners alone controls input devices. Thus, our study followed a 2x(2x2-1) between-subject design (Table 2).

<i>Factors: Display sharing / Input device control</i>			
<i>Dyad agreement</i>	Shared display & Participant controls	Shared display & Partner controls	Separate displays & Both partners control
Pre-agreement	Scenario 1: 18.94% (n = 43)	Scenario 2: 17.62% (n = 40)	Scenario 3: 16.30% (n = 37)
No pre-agreement	Scenario 4: 14.10% (n = 32)	Scenario 5: 17.18% (n = 39)	Scenario 6: 15.86% (n = 36)

Table 2. Experimental design.

4.3. Experimental procedure

The study's survey was administered through the Qualtrics survey administration online platform (Qualtrics, Seattle, Washington, U.S.A.). The activity flow was as follows. After directives, ethics information, and consent pages, participants were presented the scenario they had to picture themselves in. The scenario page related a story and a related summary picture. Next, they had to answer questions assessing their understanding of the scenario they had been assigned to, followed by a questionnaire reporting about their joint shopping experience in the pictured scenario, personal traits, and demographics.

4.4. Measures

We used previously validated measures and assessed reliability our final dataset. We measured dyadic conflict based on the measurement items proposed by Ma et al. (2017), including items measuring cognitive conflict, affective conflict, behavioral conflict, and interest conflict. We measured intention to continue joint e-commerce system use by drawing from Bhattacharjee (2001). To measure participants' involvement traits as control variable, we used the measures proposed by Laurent and Kapferer (1985), and we measured co-presence during the shopping activity, as control variable, based on measures from Kim et al. (2013). Besides, we measured effort for final consensus and time for final consensus using new scales, as we didn't find these construct's measures in the literature. Cronbach's α of our measurement instruments were satisfactory (between 0.638 and 0.968), reliabilities of 0.50 to 0.60 being deemed sufficient at early stages of research (Cronbach, 1970; Moore and Benbasat, 1991).

5. Analysis and results

We performed two successful manipulation check studies to pretest our factor manipulation (see Table 3 for overall satisfaction result).

	Sample size	Manipulation check result
Pretest 1	107	Satisfactory
Pretest 2	111	Satisfactory
Full study	227	Satisfactory

Table 3. Manipulation check global assessment.

Based on an average experimental group sample size of 38, our statistical power was 97% at $\alpha = 0.10$ to detect a high effect size of Cohen's $d = 1$. We applied a hierarchical regression approach to test our research model. We first ran statistical models without control variables, then we added control variables to the models. Moreover, the research model was tested separately with overall conflict and with subdimensions of conflict. To test the influences from the input layer of the research model, we ran two-way analyses of covariance (ANCOVA) and two-way analyses of variance (ANOVA), along with contrasts analyses for all statistically significant F-tests. Besides, we tested influences among mechanisms and outcomes layers' constructs using parallel mediation analysis methodology proposed by Hayes (2013). In that regard, we used Hayes' PROCESS macro, which has been a reference tool for parallel mediation analysis.

5.1. Influences from the input layer

Because our research model suggests a full mediation by dyadic conflict, although they were not hypothesized, we tested direct effects of the IVs on effort for final consensus, time for final consensus, and intention to continue joint IT use (referred to as intention to continue) – see Table 4 for related F-test results. Regarding intention to continue, two-way ANCOVA with dyadic conflict, effort for final consensus, and time for final consensus as covariates revealed non-statistically significant main effect of each IV on participant's intention to continue, and no interaction effects. Moreover, we tested direct influence of IVs on effort for final consensus through an ANCOVA with dyadic conflict as covariate, finding non-statistically significant main effects and no interaction effects of IVs. We also assessed direct influence of IVs on time for final consensus through an ANCOVA with dyadic conflict as covariate, finding non-statistically significant main effect and no interaction effects. Finally, we tested the hypothesized direct influences on dyadic conflict by running two-way ANOVA with contrast analysis between the marginal means of dyadic conflict for each IV.

Regarding display sharing, results showed significantly higher dyadic conflict in the condition with shared display than in that with separate displays

($F(1, 218) = 6.053$; $p = 0.008$; C.I. = [0.115; 0.584]) and significantly higher dyadic conflict in the condition with no dyad pre-agreement than in that with dyad pre-agreement ($F(1, 213) = 4.971$; $p = 0.014$; C.I. = [0.077; 0.517]). We also obtained the following results: higher dyadic conflict as reported in the “Partner controls” experimental condition than that in the “Participant controls” condition ($F(2, 213) = 4.989$; $p = 0.021$; C.I. = [0.066; 0.598]); higher dyadic conflict as reported in the “Partner controls” experimental condition than that in the “Both partners control” condition ($F(2, 213) = 4.989$; $p = 0.001$; C.I. = [0.241; 0.790]); and non- statistically significant difference between dyadic conflict as reported in the “Participant controls” and that in the “Both partners control” condition ($F(2, 213) = 4.989$; $p = 0.131$; C.I. = [-0.086; 0.453]). Besides, no interaction effects of IVs were found. As a result, the hypotheses H1(a), H2(a), H3(a), and H4(a) were supported.

consensus, and time for final consensus. Results support the hypotheses H1(b), H1(c), H1(d), H2(b), H2(d), H3(b), H3(c), H3(d), H4(b), H4(c), and H4(d). However, the hypothesis H2(c) was not supported. Due to space constraint, statistics tables about dyadic conflict subdimensions are available on demand.

5.2. Mechanisms and consequences

We tested relationships among dyadic conflict, effort for final consensus, time for final consensus, and intention to continue, using the SPSS Statistics software’s version of Hayes (2013)’s PROCESS macro, based on the model 4 of parallel mediations. Our statistical model (herein named Model DC) used dyadic conflict as IV, effort for final consensus and time for final consensus as parallel mediators, and intention to continue as dependent variable (DV). Results of model DC showed statistically significant main effects of dyadic conflict respectively on effort for final consensus ($F(1,225) = 481.940$; $p = 0.000$; C.I. = [0.783; 0.911]), time for final consensus ($F(1, 225) = 258.974$; $p = 0.000$; C.I. = [0.692; 0.850]), and intention to continue ($F(3, 223) = 168.022$; $p = 0.000$; C.I. = [-0.865; -0.607]). We also found a main effect on intention to continue respectively from effort for final consensus ($F(3, 223) = 168.022$; $p = 0.048$; C.I. = [-0.268; -0.002]) and time for final consensus ($F(3, 223) = 168.022$; $p = 0.039$; C.I. = [-0.222; -0.008]). These results support our hypotheses H5(a), H6(a), H7(a), H8, and H9. To test the parallel mediation models with subdimensions of dyadic conflict, we successively ran the PROCESS macro model 4 with one of the subdimension as IV and the other subdimensions as covariates (we name Model Cog the model with cognitive conflict as IV, Model Aff the one with affective conflict as IV, and Model Beh the one with behavioral conflict as IV). We calculated confidence intervals through bootstrap method with 5000 samples. Model Cog hypotheses H5(b) and H6(b) were supported, while H7(b) was not; Model Aff hypotheses H5(c), H6(c), and H7(c) were supported; and Model Beh hypotheses H5(d), H6(d), and H7(d) were supported. Due to space limits, details about Model Cog, Model Aff, and Model Beh are available on demand.

DV	IV	R ²	MSE	df	df (error)	F-value	p-value	Hypothesis
Intention to continue	Dyad pre-agreement	0.689	0.279	1	212	0.244	0.622	None
	Input device control	0.689	0.873	2	212	0.764	0.467	None
	Display sharing	0.689	1.381	1	215	1.221	0.270	None
	Dyad pre-agreement * Input device control	0.689	1.401	2	212	1.225	0.296	None
	Dyad pre-agreement * Display sharing	0.689	2.419	1	215	2.139	0.145	None
Effort for final consensus	Dyad pre-agreement	0.678	1.594	1	214	1.662	0.199	None
	Input device control	0.678	0.663	2	214	0.691	0.502	None
	Display sharing	0.678	1.369	1	217	1.442	0.231	None
	Dyad pre-agreement * Input device control	0.678	0.281	2	214	0.293	0.747	None
	Dyad pre-agreement * Display sharing	0.678	0.472	1	217	0.497	0.482	None
Time for final consensus	Dyad pre-agreement	0.528	0.602	1	214	0.406	0.525	None
	Input device control	0.528	1.579	2	214	1.066	0.346	None
	Display sharing	0.528	0.985	1	217	0.662	0.417	None
	Dyad pre-agreement * Input device control	0.528	1.673	2	214	1.129	0.325	None
	Dyad pre-agreement * Display sharing	0.528	3.105	1	217	2.087	0.150	None
Dyadic conflict	Dyad pre-agreement	0.669	4.656	1	213	4.971	0.027	H4(a)
	Input device control	0.669	4.674	2	213	4.989	0.008	H2(a), H3(a)
	Display sharing	0.669	5.659	1	218	6.053	0.015	H1(a)
	Dyad pre-agreement * Input device control	0.669	0.493	2	213	0.526	0.592	None
	Dyad pre-agreement * Display sharing	0.669	0.698	1	218	0.747	0.388	None

Note. IV = independent variables; DV = dependent variables; MSE = mean squared error; df = degrees of freedom.

Table 4. Results: conflict mediation analysis.

We also tested direct influences of the IVs by considering either of cognitive conflict, affective conflict, and behavioral conflict as dependent variable. To do so, separately for each of those subdimensions of dyadic conflict, we conducted the same statistical tests as in the previous paragraph, replacing dyadic conflict in the statistical models with its subdimensions as covariates, and testing direct effects of IVs on intention to continue, effort for final

6. Discussion

6.1. Findings

In this study, we put forward the role of dyadic conflict during joint IT use in the context of online shopping. Dyadic conflict can be considered a central

construct in the sense that it may be very influential to behavioral intentions of users involved in a joint online shopping activity. Almost all our hypotheses were supported, answering all our research questions.

Regarding the joint IT use context, we found that computer display sharing and input device control directly influence dyadic conflict (RQ1, RQ2). For joint IT task performance, sharing computer display is a factor of dyadic conflict, as it is likely to trigger competition over control of system interactions (Mekki Berrada, 2011). As these interactions are done through input devices, our findings suggest that user's perception of dyadic conflict is influenced by the role the user plays during joint tasks. A dyad member is likely to perceive higher conflict when he or she does not control input devices and only indirectly interacts with the system, but the user would perceive less conflict when he or she controls input devices alone or when each dyad member uses a separate device during the task – each of them controlling his or her own device. Perceived dyadic conflict would be equivalent to each other in these latter two configurations. We also found a direct influence of dyad pre-agreement on dyadic conflict (RQ3). When user dyads engage in a joint task having made initial consensus upfront over common objectives or choices to be made together, they are likely to experience a better joint use experience than when no upfront consensus is made. This finding supports past research findings suggesting that conflict emerges from disagreement (Barki and Hartwick, 2004).

Overall, we found no direct influences from display sharing, input device control, and dyad pre-agreement on intention to continue, effort for final consensus, and time for final consensus. Instead, we found that the influences of these three exogenous constructs are fully mediated by dyadic conflict overall and more specifically by cognitive, affective, and behavioral conflict, respectively (RQ3). Clearly, dyadic conflict can be considered an essential construct for understanding how joint IT use system and dyad settings impact users' behavioral intentions.

Although dyadic conflict fully mediates the influence of our research model's exogenous constructs on user's intention, this full mediation is partially mediated in parallel by the required effort for final consensus and time for final consensus (RQ1). Addressing subdimensions of conflict reveals that dyad having divergent opinions about the joint task is not enough to influence users' intention to continue. It takes that users often experience affective conflict or behavioral conflict, affective conflict being the most directly influential to users' intention to continue. Clearly, dyadic conflict shows promising explanatory power for future research on joint IT use.

Finally, our findings reveal that our model is highly explanatory. Display sharing, input device control and dyad pre-agreement explained 66.9% of variance in dyadic conflict. Moreover, dyadic conflict explained about 68.2% of variance in effort for final consensus and 53.5% of variance in time for final consensus. Overall, we were able to explain 69.3% of variance in our model's joint IT use outcome.

6.2. Implications and recommendations

Our findings have several implications for theory. First, an important takeaway of this paper is that user's behavioral intention vis-à-vis IT use is influenced not only by individual factors as proposed by most models of IT use but also by factors at the collective level, when IT is used jointly by users. This is even more relevant for tasks typically performed together by two users or more, such as pair programming or couple online shopping. IS researchers have called for the multilevel expansion of the conceptualization of IT use. The present study is a piece of answer to that call.

Our findings suggest a highly explanatory power of our model. Clearly dyadic conflict experienced during joint IT use and resulting effort and time required are important to understanding why individuals continue engaging in joint IT tasks. Future studies may consider influences of these constructs when investigating multilevel mechanisms of IT use.

Finally, our findings suggest that computer setup in which dyad users perform a joint task and the extent to which they have common goals prior to engaging in the joint task influence individual intentions, but this influence is fully mediated by dyadic conflict happening during the task. Thus, minimizing dyadic conflict may represent an interesting means for mitigating user's adverse behavior against IT use. Dyad pre-agreement features appear to be determinant in that purpose, as it permits anticipation and upfront settlement of disputes or clashes that would otherwise generate dyadic conflict states during joint tasks.

On a practical note, our study evidences that sharing the same computer or display can be an important source of conflict during joint IT use. Our recommendations to system designers are multiple. First, when display sharing is not compulsory in joint IT tasks, it is likely that collaborating users each need to perform different subtasks from their partner's subtask at the same time, though in an interdependent way. In such context, system architectures should account for the modularity of subtasks constituting joint system use cases, by permitting the subtasks to be performed by dyad users, each of them using a separate device, in parallel but synchronously, with real-time rendering of each other's actions. Regarding

internet browsing by couples, online platforms may incorporate a co-navigation feature, which allows two partners to separately browse the same webpage while monitoring each other's navigation.

Furthermore, when display sharing is compulsory, that is, the joint task cannot be performed with direct interactions of both dyad users with system interface at the same time, the dyad is made of a controlling user and a non-controlling user. In that case, system architectures may mitigate risk of conflict in several ways. For example, computer hardware and operating systems may incorporate dual-control modes, that is, functionalities permitting the cohabitation of two mice with independent cursors in the system interface, each of them being controlled by a different user while the two users perform a joint task. Moreover, software architects may consider a system functionality permitting two dyad members sharing one screen to take control of the mouse cursor in turn, either voluntarily or compulsorily. Finally, conflict may emerge from diverging interests during dyadic use of a shared interface (Ma et al., 2017), which could translate into user gaze behavior within the screen (i.e., users would likely look at locations of interest for them in the screen). Hence, allowing controlling user to know at a glance where in the screen the other user is looking may promote better coordination (Thepsonthorn et al., 2016), and vice-versa. IT practitioners may incorporate in systems the display of the gaze location of the noncontrolling user on the shared screen, through eye-tracking technology.

Regarding the influence of pre-agreement about the objectives of the task, for IT tasks with clearly identifiable and specific objectives, system designers may foresee software interfaces permitting a user dyad to take some time to agree on common goals or preferences related to joint tasks, voluntarily or compulsorily, prior to engaging in the joint task. Systems could incorporate a joint-use operating mode as exemplified in Figure 3, aiming at generating better joint IT use experience in use cases involving user dyads, besides default individual-use operating mode.

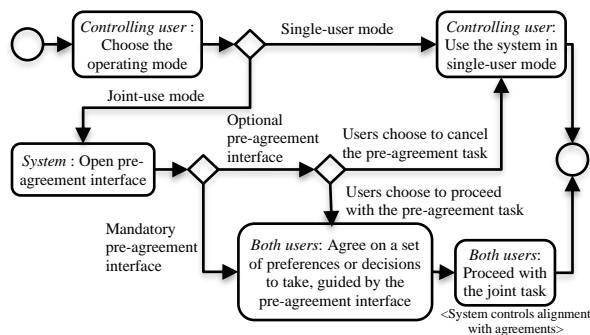


Figure 3. Design pattern in joint-use operating mode.

7. Conclusion

This paper represents one of few research works investigating mechanisms of joint IT use by user dyads, particularly in a multilevel fashion, and represents an encouraging starting point for future empirical research on the joint IT use phenomenon. Our findings augment understanding of why user dyads may experience conflict (including cognitive, affective, behavioral, and interest-based conflict) during joint use of an IT, and why they may or may not intent to continue the joint activity. Moreover, we investigate conflict during IT use, a construct that has been seldom explored in the IT use literature despite its apparently central role in joint IT use, though it has been examined in other IS research streams such as in IT project management literature (e.g., Boonstra et al., 2015; Bang et al., 2018). Besides, our model of joint IT use was found to be highly explanatory of mechanisms happening when user dyads jointly use an IT and highly explanatory of user behavioral intention. Finally, our recommendations to IT practitioners may constitute an important ground for generating new insights for new types of IT systems whose design is not only centered on single-user experience but also on multiuser experience.

12. References

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