How Do Personality, Synchronous Media, and Discussion Topic Affect Participation?

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ABSTRACT

The development of digital technologies increases the use of distance synchronous (real-time) interactions among people. The study explores whether the *readiness to participate*, the degree of *actual participation*, and the *quality of contribution* to synchronous online group discussions is affected by participant personality, media characteristics, and discussion topic sensitivity. The relation between anticipated and actual participation was investigated, as well as the *interpersonal and gender equalization* effects of online communication. An online self-report viral survey was completed by 405 adult Internet users. Following that, 120 volunteers extracted from this sample were randomly assigned to small, gender-mixed groups, employing face-to-face, online audio or online text chat experimental conditions, and conducted two non-moderated discussions (having low and high degrees of topic sensitivity). A greater interest in discussing sensitive over non-sensitive topic can explain higher participation and quality of contribution. Online text chat appeared as an efficient medium, in which the quality of participant contributions was similar to spoken discussions, obtained by smaller amount of words. Discussing sensitive topic, participants felt more comfortable using "lean" text-only medium. As hypothesized, participant personality affected the involvement in discussions: extroverts preferred taking part via a more revealing communication medium while introverts expressed greater readiness for holding discussions via text chat.

Keywords

Synchronous participation, Extroversion-introversion personality trait, Discussion topic, Audio and text chat, Interpersonal and gender equalization effect

Introduction

In recent years, online communication technologies have penetrated almost every aspect of our life and have become an essential element in interpersonal interactions, including study and work environments. The fast development of digital communication increases technology-mediated participation and the use of online synchronous communication among people. Synchronous technologies enable real-time interpersonal interactions in cyberspace that creates a social environment based on Internet infrastructure (Barak & Suler, 2008). These online interpersonal interactions are held either through one-to-one (personal) or group communication. This study explores some of the psychological aspects of synchronous group interactions through the Internet. We argue that involvement in online group discussions is affected, among other factors, by participant personality, medium characteristics, and discussion topic. Our study investigates the degree of quantitative and qualitative participation in face-to-face (FtF) communication versus technology-mediated interactions through audio chat and text chat held in small discussion groups. The study explores whether the readiness to participate, as well as the degree of actual involvement in group discussions, is affected by participant personality (i.e., extroversion-introversion), medium characteristics, and the sensitivity of discussion topic. In addition, we investigated whether online participation is more balanced compared to offline one, because of the diminished cues for social status and the gender differences between communicators.

Related Studies

There are several theories that differentiate **media** by their inherent features in order to predict an efficient communication for interpersonal and group interactions. One of the leading theoretical approaches is Media Richness Theory (MRT; Daft & Lengel, 1984). According to MRT, communication media varies in their ability to transmit social communication cues; FtF communication—the "richest" medium—is considered the most efficient way to convey complex messages. Empirical research regarding the influence of media richness on communication provides mixed results: some studies found evidence supporting it (see review by Donabedian, 2006); other findings pointed to the fact that distracters provided by rich medium may draw attention away from the transmitted message and

negatively affect communication (Blau & Caspi, 2008, 2010; Setlock, Quinones & Fussell, 2007). Some researchers claimed that a "lean" communication medium (e.g., e-mail or text chat) may still provide rich interpersonal interactions. Walther's (1996, 2007) findings on the "hyperpersonal effect" of e-communication showed that text-based interactions can possibly equal or even exceed relational effects derived from comparable FtF interactions. This approach received extensive theoretical and empirical support in studying online communication (e.g., Joinson, 2007; Suler, 2004) and e-learning (e.g., O'Sullivan, Hunt, & Lippert, 2004). However, Walther's claim that online video, audio, text, or future applications may be as efficient as FtF communication (Walther, Loh & Granka, 2005) was empirically studied mostly in text environments. The increasing use of online audio and video communication (Ng, 2007) requires investigating the impact of these media on online behavior of participants. As a normal and a primary communication ingredient, voice provides meta-communication features of human messages through loudness, intonation, pitch, and breaks (Pickett, 1998). According to the Media Naturalness Theory, the ability to transmit human voice is critical for determining the degree of medium naturalness (Kock, 2009; Kock, Chatelain-Jardón, & Carmona, 2008). Therefore, voice chat may have a different effect on interpersonal interactions than text chat (Barak, 2007) because of the different degrees of anonymity (visual anonymity versus both visual and auditory anonymity), and may result in different group behavior (Blau & Caspi, 2007).

Studies comparing **participation** through FtF and synchronous online communication revealed inconsistent results: while some of them found decreased participation in voice and text chat (Berge & Fjuk, 2006), others claimed that text chat (Hudson & Bruckman, 2002; Lobel et al., 2002) and audio communication (Blau & Caspi, 2008, 2010) increase participation compared to FtF interactions.

Personality characteristics of users may impact interpersonal and group communication; the trait of extroversion-introversion is especially relevant to online behavior (Amichai-Hamburger, 2007, Amichai-Hamburger & Barak, 2009). An extrovert is a friendly person who seeks company, desires excitement, takes risks, and acts on impulse, whereas an introvert is a quiet, reflective person who does not enjoy large social events, prefers his or her own company, and does not crave excitement (Eysenck & Eysenck, 1975). Discussing the Internet as a compensatory psychological tool, Kraut et al. (2002) claimed that people who easily befriend offline would also have more online friends (so called "the rich get richer" phenomenon). Other researchers hold that the protected Internet environment may assist introverts in expressing themselves more freely in an online than in offline relationships ("the poor get richer"; Amichai-Hamburger, 2007; Maldonado et al., 2001; McKenna, Green & Gleason, 2002). While extroverts feel comfortable both online and offline, introverts express themselves significantly more freely over the Internet (McKenna, Seidman, Buffardi & Green, 2007). Interacting online, introverts even adopt offline behavior patterns of extroverts (Amichai-Hamburger, Wainapel & Fox, 2002; Maldonado et al., 2001; McKenna & Seidman, 2005) which could be reflected in more active participation in online rather than in offline discussions (McKenna et al., 2007).

Research shows that the relationships between people's personality traits and their online behavior may be moderated by type and amount of the Internet use (Anolli, Villani & Riva, 2005), participant demographics (Amichai-Hamburger & Ben-Artzi, 2000; Maldonado et al., 2001), and the sensitivity of **discussion topic** (Hertel, Schroer, Batinic & Naumann, 2008). However, the influence of topic sensitivity on the readiness to partake in online discussions was examined and studied by these researchers in asynchronous communication environment and may differ from real-time interactions.

In most cases, compared to offline interactions, online environment provides more equal opportunities to people to voice themselves, regardless of status, gender, race, wealth, or appearance (Suler, 2004). Online group interactions diminish external and internal, real and fictitious status cues (Amichai-Hamburger, 2007; Amichai-Hamburger & Barak, 2009; Barak, Boniel-Nissim, & Suler, 2008; McKenna, 2008). This **equalization effect** of online communication was found in several laboratory experiments (Dubrovsky, Kiesler, & Sethna, 1991; Siegel, Dubrovsky, Kiesler, & McGuire, 1986) and field studies (Warschauer, 1996). These studies, however, tested the equalization effect through textual communication, which may differ from equalization in spoken online interactions.

Study Goals and Hypotheses

This study explores some psychological aspects of synchronous group interactions. Group behavior in FtF communication versus online interactions through audio chat and text chat were compared. Specifically, the study

examined whether the readiness to participate, the degree of actual involvement, and the quality of contribution to discussions are affected by participants' personality (i.e., extroversion-introversion), communication mode (i.e., FtF, online voice chat, or online text chat), and the sensitivity of discussion topic (low versus high). The readiness to partake in discussions reported by participants was crosschecked with the degree of their actual participation. In addition, the interpersonal and gender equalization effect of online communication was explored.

We hypothesized that extroversion-introversion would affect the degree of anticipated and actual participation as well as the quality of contribution to discussions in F2F communication versus online voice chat or text chat interactions, and that the sensitivity of discussion topic would augment this trend. In addition, we hypothesized that the readiness to participate would positively correlate with the degree of actual involvement in discussions. Concerning the equalization effect, we hypothesized that, in terms of both interpersonal and gender equality, online participation would be more equal compared to offline ones, and the participation using text chat would be more equal in comparison to participation through audio chat.
The research is composed of two sequenced sub-studies.

Study 1

The first study investigates the *readiness to participate* in discussion as related to medium characteristics, participant personality, and the sensitivity of discussion topic.

Method

Participants

An online viral sampling of 405 Israeli adult Internet users, 118 of them men (29.1%), was composed. Participants' age range was 18-76, median 29, mean 31.89, SD 10.97. Level of education: 37.5% were high-school graduates, 9.9% had professional post-school training, 31.9% held BA degrees, and 20.7% held masters or doctoral degrees. Similar (relatively high) percentage of graduate participants (38%) was reported by Mesch and Elgali (2009) in a survey of 1,000 Israeli Internet users. Table 1 presents the participant self-reported usage of the Internet in general and synchronous communication tools in particular.

Table 1. Percentages of the Internet and Communication Applications Usage (n = 405)

Usage level	General Internet usage	Personal chat	Chat room	Audio communication
Each day	85.7	24.4	0.2	0.7
2-3 times a week	10.6	14.6	0.7	6.2
Once a week- Once a month	3.7	13.8	3.2	9.4
Less than once a month	0	15.1	6.9	18
Not using	0	31.9	87.2	62.7

Instruments

The participants completed an online self-report questionnaire, which include two parts. In order to measure the trait of *extraversion-introversion* we used a Hebrew short version of the NEO-PI-R questionnaire based on the Big Five model (Costa & McCrae, 1992). The score of extraversion-introversion (Range=21-69, Medium=51, Mean=51.26, SD=8.08) was computed by summing up participant answers to 12 items (scale 1-6); internal consistency α=.80. Participants were divided into two groups (extroverts vs. introverts) using the median scale score (51; the participants who received the median score were defined as introverts). In addition, following Hertel et al. (2008), the participants were asked to imagine first group discussion on non-sensitive topic ("Please imagine chatting with a friend, colleague, or peer about the last weekend"), then the sensitive one ("Please imagine you are angry about the egoistic behavior of a friend, colleague, or peer"), and report about their *readiness to discuss* FtF, through audio and text chat (scale 1 = "not at all"; 8 = "very much").

Procedure

Online viral sampling method was used: a link to online self-report questionnaire was sent to participants by email asking for resending the link to their contacts and partaking in further experiments.

Results

Effects of Media and Discussion Topic on the Readiness to Participate

In order to test the study hypotheses, series of ANOVA Repeated Measures tests were conducted. Table 2 shows the means and standard deviations of the participants' readiness to discuss the non-sensitive and sensitive topics through FtF, audio and text chat.

Table 2. Means and SDs of Readiness to Discuss by Topic and Communication Mode (n = 405)

Topic ↓	Medium→	FtF	Audio	Chat	Total
Non-sensitive	M	6.60	3.15	3.23	**4.33**
	SD	1.57	1.90	1.95	**1.06**
Sensitive	M	6.06	2.66	3.06	**3.93**
	SD	1.98	1.77	2.26	**1.03**
Total	**M**	**6.33**	**2.90**	**3.14**	4.13
	SD	**1.43**	**1.63**	**1.80**	0.91

Table 3 presents results of the ANOVA for the effects of communication medium, discussion topic, and the interaction between the two on the readiness to participate in discussions.

Table 3. Effects of Type of Medium and Discussion Topic on the Readiness to Participate

Effect	F	df	p	Partial η²
Medium	483.1	2, 403	<.001	.71
Topic	62.02	1, 404	<.001	.13
Medium x Topic	3.45	2, 403	<.05	.03

Significant main effects were found for communication medium, the sensitivity of the discussion topic, and their interaction on participant readiness to partake in discussions. Generally, participants preferred the non-sensitive over the sensitive discussion topic (M=4.33 vs. 3.93, *p*<.001). Post-hoc tests showed that they also preferred FtF discussion rather than audio chat or text chat (M=6.33 vs. 2.90 and 3.14, *p*<.001). For online interactions, participants preferred using text chat rather than audio communication (*p*<.05). In regard to discussing a non-sensitive topic, there were no significant differences between audio and text chat, but offline interaction was preferable than both online media (M=3.15 and 3.23 vs. 6.60, *p*<.001). Concerning the online discussions of a sensitive topic, text chat was preferable over the audio chat (M=3.06 vs. 2.66, *p*<.001). Is seems that participants felt more comfortable discussing the sensitive topic via a "lean" communication medium.

Effect of Extroversion-Introversion on the Readiness to Participate

Table 4 shows the means and standard deviations of extrovert and introvert readiness to discuss non-sensitive and sensitive topics using different communication media.

Table 4. Means and SDs of Readiness to Discuss by Extroversion-Introversion, Medium, and Topic

Topic ↓	Medium→	Extroverts (n = 197)				Introverts (n = 208)			
		F2F	Audio	Chat	Total	F2F	Audio	Chat	Total
Non-sensitive	M	6.88	3.41	3.21	**4.50**	6.34	2.91	3.25	**4.17**
	SD	1.36	1.90	1.87	**1.05**	1.70	1.87	2.03	**1.06**
Sensitive	M	6.39	2.83	3.01	**4.08**	5.75	2.50	3.11	**3.79**
	SD	1.86	1.77	2.21	**0.96**	2.04	1.75	2.30	**1.06**
Total	M	**6.33**	**3.12**	**3.11**	4.29	**6.05**	**2.70**	**3.18**	3.98
	SD	**1.43**	**1.60**	**1.72**	0.86	**1.54**	**1.63**	**1.87**	0.94

Table 5 presents the ANOVA for the effects of extroversion-introversion, type of communication medium, the sensitivity of discussion topic, and their interactions, on the readiness to participate in discussions.

Table 5. Effects of Extroversion-Introversion, Medium, and Topic on the Readiness to Participate

Effect	F	df	p	Partial η^2
Extroversion	12.14	1, 404	<.001	.05
Type of Medium	484.26	2, 403	<.001	.71
Topic Sensitivity	62.01	1, 404	<.001	.13
Extroversion x Medium	3.81	2, 403	<.05	.03
Extroversion x Topic	0.14	1, 404	n.s.	.00
Medium x Topic	3.46	2, 403	<.05	.03
Extroversion x Medium x Topic	0.54	2, 403	n.s.	.00

Participant level of extroversion affected the readiness to partake in discussions: extroverts were more inclined to participate in discussions than introverts (M=4.29 vs. 3.98, $p<.001$). The interaction between participant extroversion and type of medium revealed that extroverts were more inclined to partake compared to introverts FtF (M=6.63 vs. 6.05, $p<.001$) and through audio chat (M=3.12 vs. 2.70, $p<.01$), but not through text chat. For online discussions, extroverts did not show preferences for a particular communication medium, while introverts preferred text chat over audio chat (M=3.18 vs. 2.70, $p<.01$). Thus, introverts expressed greater readiness than extroverts for discussions via medium low in transmitting social communication cues.

Study 2

In this study we explored the degree of *actual participation* in a group discussion and evaluated the *quality of contribution* to discussions, as influenced by participant level of extraversion-introversion, communication medium, and sensitivity level of the discussion topic. In addition, we examined the *interpersonal and gender equalization* effect of online communication, as well as the *relationship between anticipated and actual participation* in discussions.

Method

Participants

The participants of the second study consisted of 120 volunteers derived from the sample generated in Study 1. Forty eight (40%) of the participants were men.

Manipulations

We manipulated the level of *sensitivity of the discussion topics* by offering two topics for discussions. For low-level sensitivity discussions we adapted the topic from Warschauer's (1996) study: "If a man and a woman are living together and each works a full-time job (40 hours a week), how much and what type of housework should each of them do?" For high-level sensitivity discussions the topic was: "Think about relationships about couples; which online or offline behavior would you characterize as unfaithfulness and for what reason?"

Measures

To enhance external validity, measurement of three of the dependent variables was conducted by using ethnographic, non-obtrusive and nonreactive, behavioral observations rather than through self-report questionnaires (Fritsche & Linneweber, 2006). For *amount of actual participation* in discussions we counted the number of words used by each participant (Range=18-1029, Median=150, Mean=184.72, SD=100). *Interpersonal equalization* was measured by participation percentage (i.e., number of words per participant divided by number of words expressed (said or written) by all group members during the discussion; Blau & Caspi, 2007; Warschauer, 1996), Range=1.27-47.84,

Median=18.86, Mean=20.00, SD=10.26. *Gender equalization* was measured by gender participation percentage (i.e., number of words expressed (said or written) by male/female participant divided by number of words of all group members during the discussion; Caspi, Chajut, & Saporta, 2008). The *quality of contribution* to discussions for each participant was assessed by average evaluation of four expert judges "blind" to the hypotheses (on a scale of 1 = "not at all"; 5 = "very much", Median=3.00, Mean=3.01, SD=1.00); between-rater agreement coefficient Kendall's W=.70. The evaluation of contribution was based on suggesting new ideas, definitions, focusing, and summarizing discussions.

Procedure

Participants were randomly assigned to gender-mixed experimental conditions and conducted, in groups of five, two short (average of 18.40 min.) non-moderated discussions on both low and high degree of topic sensitivity, 40 participants in each communication mode. Similarly to online natural discussions, each discussion in this study was non-moderated and was terminated when the participants felt they fully expressed their opinion. The study did not use the counterbalance procedure; instead, all groups discussed non-sensitive topic before the sensitive one. Discussing the sensitive topic first could have left the participants exited and neutralize the difference between the topics. Skype™ application was used for online discussions, either for text or audio chat. The discussions were recorded, transcribed, and evaluated by four expert judges for the quality of contribution for each participant. The amount of actual participation, as well as interpersonal and gender equality were calculated. The readiness to partake in discussions was compared to the actual behavior of the participants.

Results

Effects of Media and Discussion Topic on Actual Participation

Table 6 shows the means and standard deviations for the amount of actual participation (number of words per participant) in discussing non-sensitive and sensitive topics FtF, through audio and text chat.

Table 6. Means and SDs of Actual Participation by Topic and Medium

Topic ↓	Medium→	F2F (n=40)	Audio (n=40)	Chat (n=40)	Total (n=120)
Non-sensitive	M	150.63	154.90	109.45	**138.33**
	SD	124.71	120.75	86.98	**116.74**
Sensitive	M	281.73	273.55	138.05	**231.11**
	SD	169.56	120.83	105.52	**121.38**
Total	**M**	**216.18**	**214.23**	**123.75**	184.72
	SD	**116.82**	**108.92**	**87.47**	100.40

Table 7 presents the analysis of variance for the effects of communication medium, discussion topic, and the interaction between the two on the amount of actual participation in discussions.

Table 7. Effects of Medium and Topic on the Amount of Actual Participation

Effect	F	df	p	Partial η^2
Medium	5.29	2, 117	<.01	.08
Topic	24.33	1, 117	<.001	.17
Medium x Topic	3.05	2, 117	<.05	.05

Significant main effects were found for communication medium, the sensitivity of discussion topic, and their interaction. Generally, actual involvement was greater for the sensitive over non-sensitive discussion topic (M=231.11 vs. 138.33, p<.01). Post-hoc tests showed no difference between FtF and audio chat discussions (M= 216.82 and 214.23, respectively); however, participation in audio chat was significantly higher compared to text chat (M=214.23 vs. 123.75, p<.01). The interaction effect showed more active participation in sensitive compared to non-sensitive topic for FtF (M=281.73 vs. 150.63, p<.01) and audio discussions (M=273.55 vs. 154.90, p<.01), but not for text chat (M=138.05 vs. 109.45, p>.05). Discussing a sensitive topic, participation was significantly smaller in text chat compared to FtF and to audio chat (M=138.05 vs. 281.73 and vs. 273.55, respectively, both p<.01).

However, in discussing a non-sensitive topic there was no significant differences among types of media that were found.

Effect of Extroversion-Introversion on Actual Participation

Table 8 shows the means and standard deviations of the actual participation discussing non-sensitive and sensitive topics by different communication media by level of extroversion.

Table 8. Means and SDs of Actual Participation by Extroversion-Introversion, Medium, and Topic

Medium→ Topic ↓		Extroverts				Introverts			
		F2F (n=23)	Audio (n=22)	Chat (n=16)	Total (n=61)	F2F (n=17)	Audio (n=18)	Chat (n=24)	Total (n=59)
Non-sensitive	M	198.00	167.55	123.93	**167.59**	86.53	139.44	99.79	**108.07**
	SD	98.31	98.39	70.17	**81.12**	46.70	95.04	66.81	**64.66**
Sensitive	M	300.00	337.68	164.56	**278.07**	257.00	195.17	120.38	**182.56**
	SD	108.12	156.52	82.97	**109.89**	104.42	99.41	85.60	**82.56**
Total	M	**249.00**	**252.61**	**144.25**	**222.83**	**171.76**	**167.31**	**110.08**	**145.30**
	SD	**93.91**	**119.71**	**68.78**	**88.70**	**64.42**	**76.12**	**76.96**	**67.74**

Table 9 presents the ANOVA for the effects of extroversion-introversion, communication mode, the sensitivity of discussion topic, and their interactions on the amount of actual participation in discussions.

Table 9. Effects of Extroversion-Introversion, Medium, and Topic on Actual Participation

Effect	F	df	p	Partial η²
Extroversion	6.17	1, 114	< .05	.06
Type of Medium	4.36	2, 114	< .05	.07
Topic Sensitivity	24.24	1, 114	< .001	.18
Extroversion x Medium	0.36	2, 114	n.s.	.01
Extroversion x Topic	0.34	1, 114	n.s.	.00
Medium x Topic	3.04	2, 114	< .05	.05
Extroversion x Medium x Topic	3.06	4, 114	< .05	.05

Participant extroversion level affected the degree of involvement in discussions: extroverts engaged in more active participation in discussions than introverts (M=222.83 vs. 145.30, $p<.05$). The interaction effect between level of extroversion and communication mode, and between level of extroversion and the sensitivity of the discussion topic on amount of participation did not reveal significant results. The triple interaction showed that extroverts were more active through audio chat discussing sensitive rather than non-sensitive topic (M=337.68 vs. 167.55, $p<.01$), while no similar difference was found among introverts. Discussing the non-sensitive topic, extroverts showed greater activity through FtF compared to text chat (M=198.00 vs. 123.93, $p<.05$); however, no significant difference was found among introverts.

Effects of Media and Discussion Topic on Quality of Contribution to Discussion

Table 10 shows the means and standard deviations for mean rater evaluations for the quality of contribution to discussions on non-sensitive and sensitive topics through FtF, audio and text chat.

Table 10. Means and SDs of Quality of Contribution by Topic and Media

Topic ↓ Medium→		FtF (n=40)	Audio Chat (n=40)	Text Chat (n=40)	Total (n=120)
Non-sensitive	M	2.54	2.91	2.70	**2.72**
	SD	1.02	1.30	1.10	**1.14**
Sensitive	M	3.29	3.41	3.18	**3.29**
	SD	1.24	1.39	1.17	**1.26**
Total	**M**	**2.91**	**3.16**	**2.94**	**3.00**
	SD	**0.92**	**1.21**	**0.84**	**1.00**

Table 11 presents the ANOVA for the effects of communication mode, discussion topic, and the interaction between the two on the quality of participant contribution to discussions.

Table 11. Effects of Medium and Topic on Quality of Contribution

Effect	F	df	p	Partial η²
Medium	0.75	2, 117	n.s.	.01
Topic	22.21	1, 117	<.001	.16
Medium x Topic	0.52	2, 117	n.s.	.01

Significant main effect was found for the level of sensitivity of the discussion topic: higher quality of participant contribution to discussions was rated for the sensitive compared to non-sensitive discussion topic (M=3.29 vs. 2.72, $p<.001$). No significant effects were found neither for communication medium nor the medium-topic interaction.

Effect of Extroversion-Introversion on Quality of Contribution to Discussion

Table 12 shows the means and standard deviations for the quality of contribution discussing non-sensitive and sensitive topics by communication mode and extroversion-introversion.

Table 12. Means and SDs of Quality of Contribution by Extroversion-Introversion, Medium, and Topic

		Extroverts				Introverts			
Medium→		F2F	Audio	Chat	Total	F2F	Audio	Chat	Total
Topic ↓		(n=23)	(n=22)	(n=16)	(n=61)	(n=17)	(n=18)	(n=24)	(n=59)
Non-sensitive	M	2.93	3.09	3.13	**3.04**	2.00	2.69	2.42	**2.38**
	SD	0.83	1.20	1.22	**1.07**	1.02	1.21	0.93	**1.03**
Sensitive	M	3.35	3.68	3.41	**3.48**	3.21	3.08	3.02	**3.09**
	SD	1.31	1.26	1.42	**1.31**	1.19	1.30	0.98	**1.20**
Total	M	**3.14**	**3.39**	**3.27**	**3.26**	**2.60**	**2.89**	**2.72**	**2.74**
	SD	**0.87**	**1.12**	**0.93**	**0.97**	**0.94**	**1.20**	**0.72**	**0.98**

Table 13 presents the ANOVA for the effects of extroversion-introversion, communication mode, the degree the sensitivity of discussion topic, and their interactions, on the quality of participant contribution in discussions.

Table 13. Effects of Extroversion-Introversion, Medium, and Topic on the Quality of Contribution

Effect	F	df	p	Partial η²
Extroversion	8.41	1, 114	< .01	.07
Type of Medium	0.72	2, 114	n.s.	.01
Topic Sensitivity	22.34	1, 114	< .001	.16
Extroversion x Medium	0.91	2, 114	n.s.	.01
Extroversion x Topic	1.54	1, 114	n.s.	.02
Medium x Topic	0.88	2, 114	n.s.	.01
Extroversion x Medium x Topic	3.08	4, 114	< .05	.05

Extroversion significantly affected the quality of participant contributions in the discussions: contribution of extroverts was greater compared to introverts (M=3.26 vs. 2.74, $p<.01$). The interaction effect between extroversion and communication mode, as well as between extroversion and sensitivity of the discussion topic, on quality of participant contribution to discussions was not found to be significant. The triple interaction showed that for introverts the quality of contribution to discussions was greater in FtF discussing sensitive rather than non-sensitive topic (M=3.21 vs. 2.00, $p<.01$), while no such a difference was found among extroverts. Discussing non-sensitive topic, the quality of contribution for introverts was greater through audio chat compared to FtF mode (M=2.69 vs. 2.00, $p<.05$); however, no similar difference was found among extroverts.

Interpersonal Equalization of Participation

Since interpersonal equalization is measured by participation percentage for each participant in group of five, average participation percentage is always 20% and therefore meaningless. The comparison between standard

deviations showed smaller variance, i.e., more equal participation, for text chat compared to F2F and discussions through audio chat (SD=8.20 vs. 12.77 and 12.89 respectively, n=40 for each medium). Levene's test for equality of variances showed significant differences between the equality of participation through text chat compared to F2F, as well as between text chat compared to audio chat (Levene's W=6.94 and 7.46 respectively, p's<.01).

Gender Equalization of Participation

Table 14 presents the means and standard deviations for the percentage of participation in discussions in the different communication modes (regardless of the discussion topic) by gender.

Table 14. Means and SDs of Participation in Discussions by Gender and Medium

Gender ↓	Medium→	FtF (n=40)	Audio Chat (n=40)	Text Chat (n=40)	Total (n=120)
Male (n=48)	M	22.84	27.39	16.89	**23.81**
	SD	12.61	12.76	8.04	**10.61**
Female (n=72)	M	19.29	17.86	21.66	**19.30**
	SD	12.06	11.79	8.17	**10.06**

Table 15 presents results of the ANOVA for the effects of gender, communication mode, and the interaction between the two on the percentage of participation to discussions.

Table 15. Effects of Gender and Medium on the Percentage of Participation in Discussions

Effect	F	df	p	Partial η^2
Gender	3.08	5, 234	<.05	.03
Medium	1.48	5, 234	n.s	.01
Gender x Medium	4.40	5, 234	<.01	.04

Significant main effect was found for gender: men participated more actively compared to women (M=23.81 vs. 19.30, p<.05). Examining the significant interaction effect it was found that there was no gender difference in the FtF mode; however, men participated more than women in audio chat (M=27.39 vs. 17.86, p<.01), in contrast women participated more actively through text chat (M=21.66 vs. 16.89, p<.05).

Readiness to Participate versus Actual Participation

The readiness to partake in discussions as reported by participants in Study 1 was crosschecked with the degree of their actual participation in Study 2. Surprisingly, Pearson correlations for the readiness to participate in FtF, audio chat, and text chat with the degree of actual participation in discussions did not reveal statistical significance (r=.13, 14, and .02 respectively, n=40 for each medium).

General Discussion

Online communication technologies are altering the traditional modes of interpersonal communication for learning and working, information consumption and creation, discussions and conversations, and knowledge construction. This study investigated the level of anticipated and actual participation, as well as the quality of personal contribution in group discussions. Discussing non-sensitive versus sensitive topic, FtF communication mode was compared to synchronous interactions through audio chat and text chat. In addition, the study explored the equalization effect of online communication compared to offline one.

Generally, the amount of actual participation and the quality of contribution to discussions were found to be greater for the sensitive over non-sensitive discussion topic. Apparently, this finding can be explained by participants' greater interest in the discussions of a sensitive topic. Based on this explanation, the use of sensitive, intriguing, and challenging topics is recommended for increasing involvement in group discussions in various social environments, including learning and work. It should be kept in mind, however, that since we could not use the counterbalance procedure in our research, there is still a rival possible explanation that a high amount of participation (and quality of

contribution) was created by the order of the discussion conditions. We recommend continued testing of the amount of actual involvement in sensitive versus non-sensitive topics in future studies.

While expressing the readiness to discuss a sensitive topic, the participants preferred a text chat over a voice chat. It seems that participants felt more comfortable discussing sensitive topics via a "lean" communication medium. The analysis of actual behavior showed that the amount of participation through text chat was smaller compared to other communication modes; this may reinforce emotional processing and reflection on the topic. Thus, for discussing sensitive topics in real-time in various interpersonal environments, employment of lean communication modes, such as text chat, is recommended.

However, across discussion subjects, smaller amount of actual participation was revealed through text chat in comparison with spoken FtF and audio chat discussions. According to Media Naturalness Theory, the ability to transmit human voice is critical for determining the degree of medium naturalness (Kock, 2009; Kock et al., 2008). Thus, voice chat has a different effect on interpersonal interactions than text chat because of the different degrees of anonymity (visual anonymity versus both visual and auditory anonymity), therefore resulting in higher levels of participation. Thus, audio chat seems to be a more appropriate medium than text chat for encouraging involvement in synchronous communication if the subject of discussion cannot be manipulated.

Lower degree of participation can be also explained by the effect of the well-known phenomenon of information overload (Hiltz & Turoff, 1985), shown to occur in text chat (Jones, Moldovan, Raban, & Butler, 2008). According to these researchers, information overload takes place because of transmitting too many messages and/or the lack of structure and coherence, which leads to diminished participant activity. Despite the advantages of chat explored in this study, textual group discussions are less structured compared to spoken ones. In contrast to clear turn-taking for speaking in FtF and audio chat communication modes, in text chats participants express themselves (i.e., write messages) simultaneously. Chatters therefore needed higher concentration in order to express their opinions and to follow parallel arguments by others, which frequently lead to diminished amounts of participation. However, the quality of contribution found in text chat discussions in the current study was similar to the spoken FtF and audio chat communication modes. Thus, text chat can be seen as an efficient form of real-time communication, in which the quality of the contribution was similar to spoken discussions obtained by shorter messages (i.e., fewer words).

As hypothesized, personality affected the readiness to partake in discussions: extroverts expressed greater readiness to participate in discussions compared to introverts. Also, this personality trait interacted with the type of medium in affecting the readiness to participate in discussions: introverts expressed greater readiness to partake in discussions via text chat compared to extroverts (who preferred more revealing communication media). Similar results revealed in analyzing the influence of extroversion on participants' actual behavior. As expected, extroverts participated in discussions significantly more actively than introverts. This finding is consistent with previous studies that reported extroverts' higher involvement in interpersonal interactions. In the current study, participation of introverts in FtF communication was very limited; a sensitive discussion topic, however, augmented the rate of participation. Interestingly, the interaction effect found between extroversion and type of media revealed that the level of participation of extroverts and introverts was similar in text chat but differed in the more natural communication modes. It seems that in synchronous communication, only text chat (i.e., low in communication richness) empowers introverts by releasing inhibitions of their anxiety of interpersonal interactions ("the poor get richer" hypothesis). However, as complicated interactions of introversion-extroversion with online communication may exist (Valkenburg & Peter, 2007), this subject should be examined more closely in future research.

Participant extroversion affected not only the amount of participation but also the quality of the discussions. The quality of extroverts' contribution to discussions, as evaluated by raters, was higher compared to the contribution of introverts. This finding has important implications for the evaluation of real-time group discussions in learning and work environments. That is, introvert learners or employees may have good ideas, but feel uncomfortable expressing them in group meetings. In this case follow-up asynchronous reflections through email, blog, or forum formats are recommended.

Our results showed gaps between the participant anticipated and actual behavior. In contrast to our hypothesis, there were no significant correlations between the readiness to partake in discussions as reported by participants in Study 1 and the amount of their actual participation in discussions as assessed in Study 2. Also, despite the clear preference for non-sensitive over sensitive discussion topics declared by participants before the experiment (Study 1), their

actual participation discussing sensitive topics was almost twice as high as discussing non-sensitive topic (Study 2). In addition, participants declared they would prefer taking part in discussions via FtF over online communication modes (Study 1); however, almost the same amount of participation was found in actual FtF and audio chat discussions (Study 2). Similarly, in expressing preferences for online communication, participants reported greater readiness to interact through text chat compared to audio communication (Study 1). However, their actual spoken participation in audio chat was almost twice as much as text chat participation (Study 2). These findings question the possibility of studying actual participant behavior by self-reported anticipations of future selections and decisions.

Regarding the equalization effect, consistent with our hypothesis, more equal interpersonal and gender-related participation was found in text chat compared to FtF and to audio communication modes. However, equality of participation in voice chat was similar to equality of participation in FtF discussions. It seems that human speech transmits important status- and gender-related cues and therefore disables the occurrence of equalization effect in spoken online interactions. Thus, in real-time communication the use of text chat might be recommended in order to empower women, minorities, and other marginalized people.

Constant changes of digital technologies challenge people with the need to master technological and social competences. Digital literacy includes, among other factors, the ability to learn, work, collaborate with others, and solve problems effectively in online learning and work environments, as well as handling interpersonal and group interactions in technology-mediated social involvement environments. The current study contributes to this area in exploring some effects of digital technologies, in interaction with participant personality, on online behavior in the context of digital literacy. Following our research, it seems to be evident that the impact of personality in interaction with media characteristics and communication content affect both participants' readiness as well as actual accomplishments in different modes of communication. By conducting this research in the natural Internet environment it has improved the ecological validity of the study and enlarged the possibility for generalization of its findings. While this study has implications concerning the use of synchronous online environments and differentiates the impact of text chat from voice chat, further investigative studies are needed to examine the growing use and possibilities of synchronous communication modes.

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