

Breaking through Fuzzy Positioning: Diverse Design Communication Strategies for Older Adults' Healthcare Wearables

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Wearable technology Design for Older Adults

Healthcare, life assistance, and independence

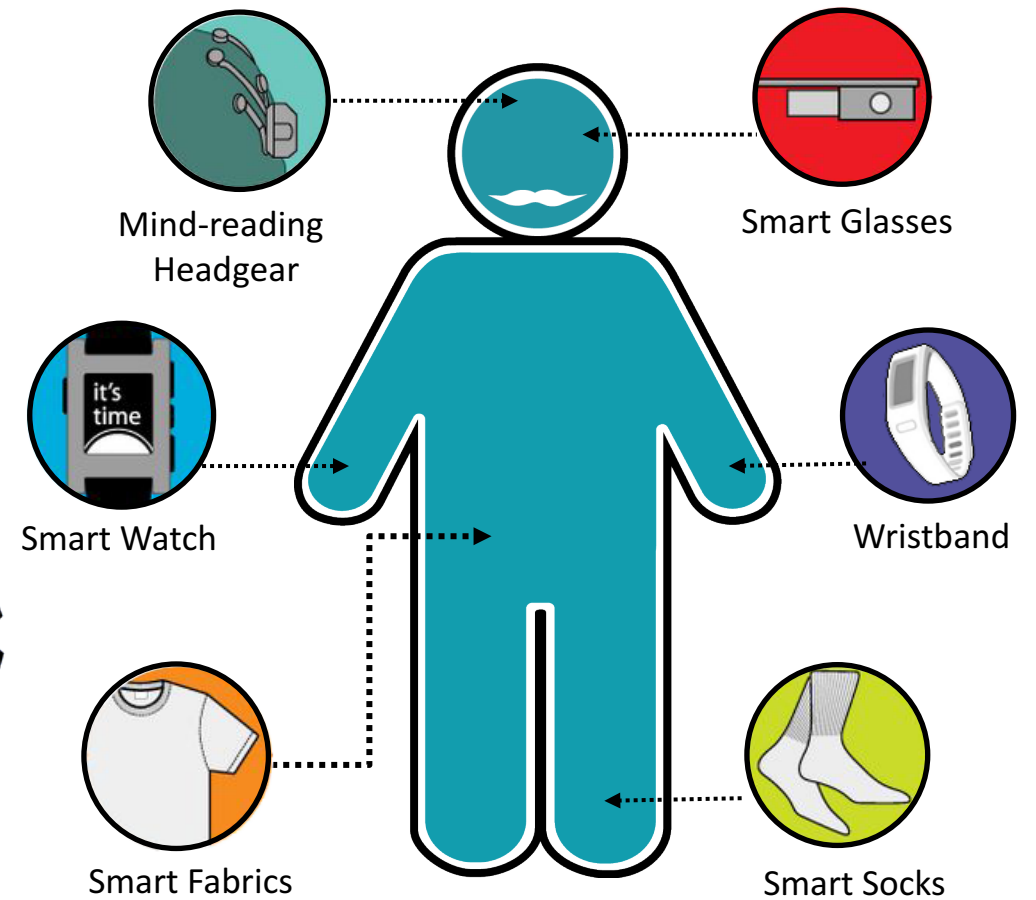


Healthcare

Self-management, Medical Care

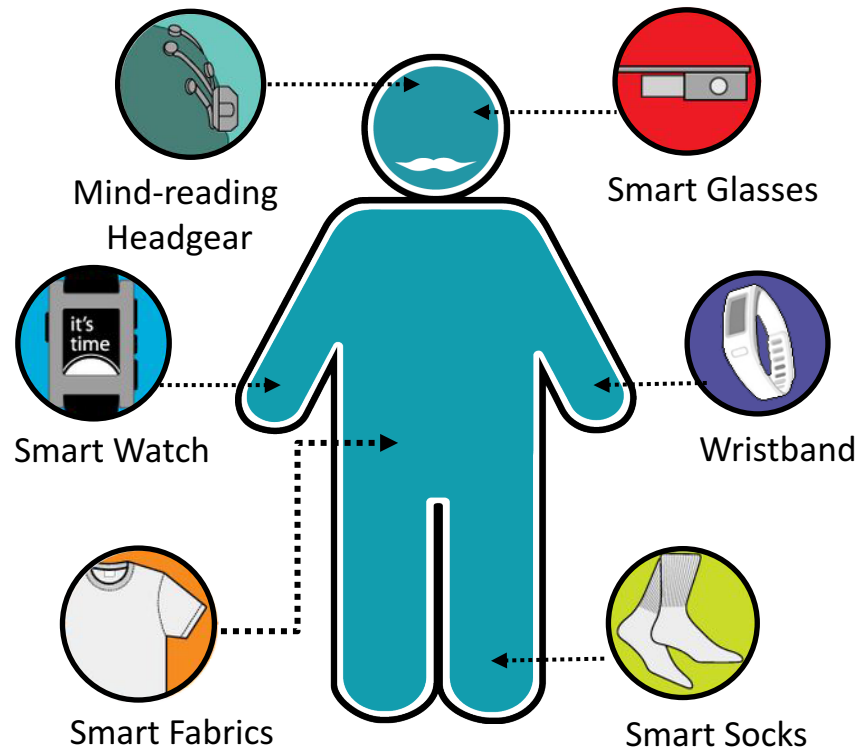


Wearables



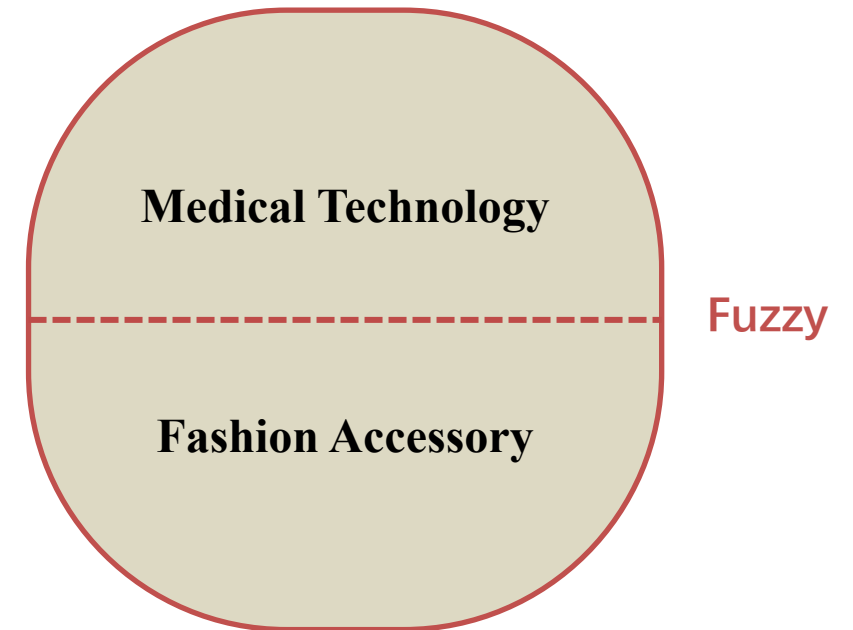
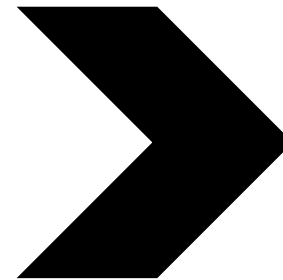
Fuzzy Product Positioning

Barriers in Healthcare Wearables



Great gap between commercials and research

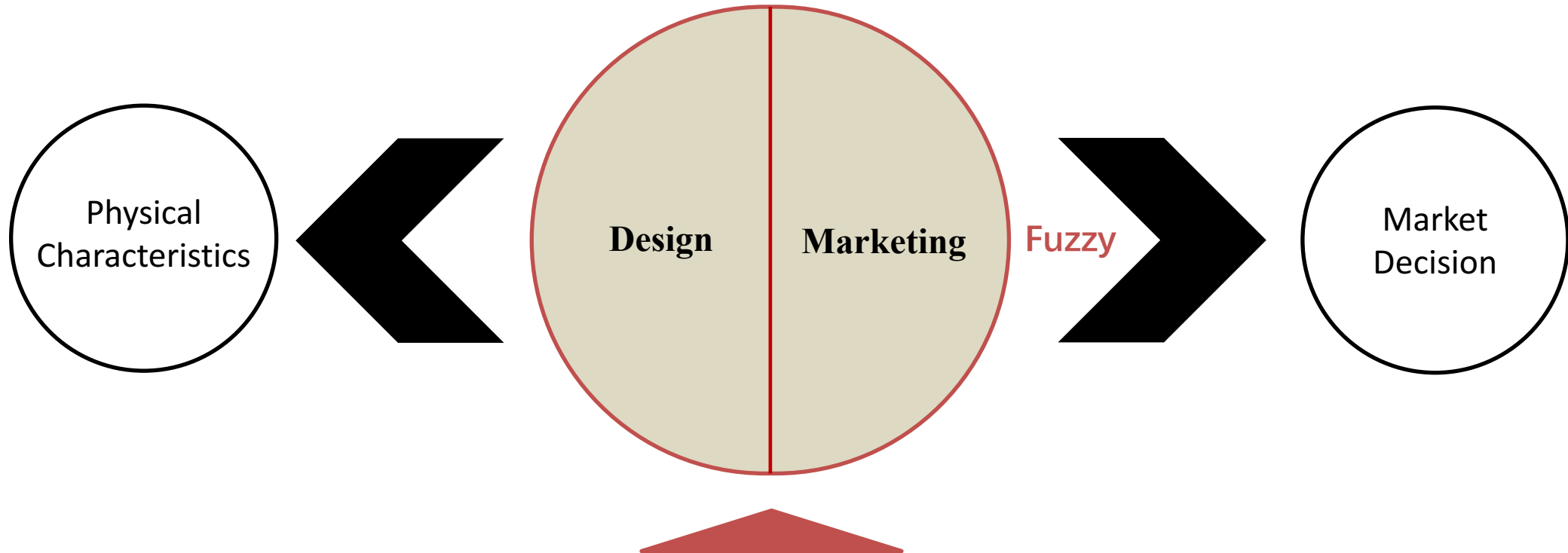
Start Point from commercials — Product Positioning



Older adults are in group with high diversity.
Designers also need some consumer psychology
knowledge on positioning to make our ethical idea
of healthcare more attractive and reasonable.

Fuzzy Product Positioning

Product Positioning

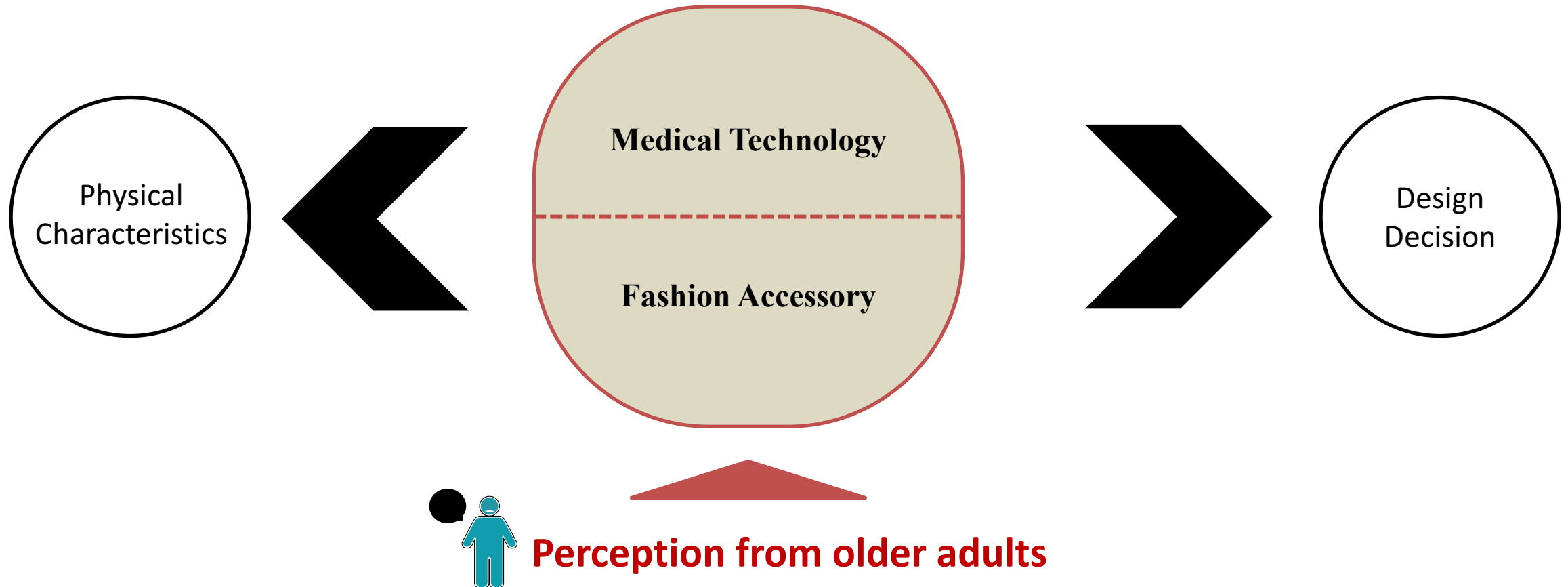


A mental process of Categorization

A mental process during which individuals make their quantities of life experiences structured by classification construction and description.

Fuzzy Product Positioning

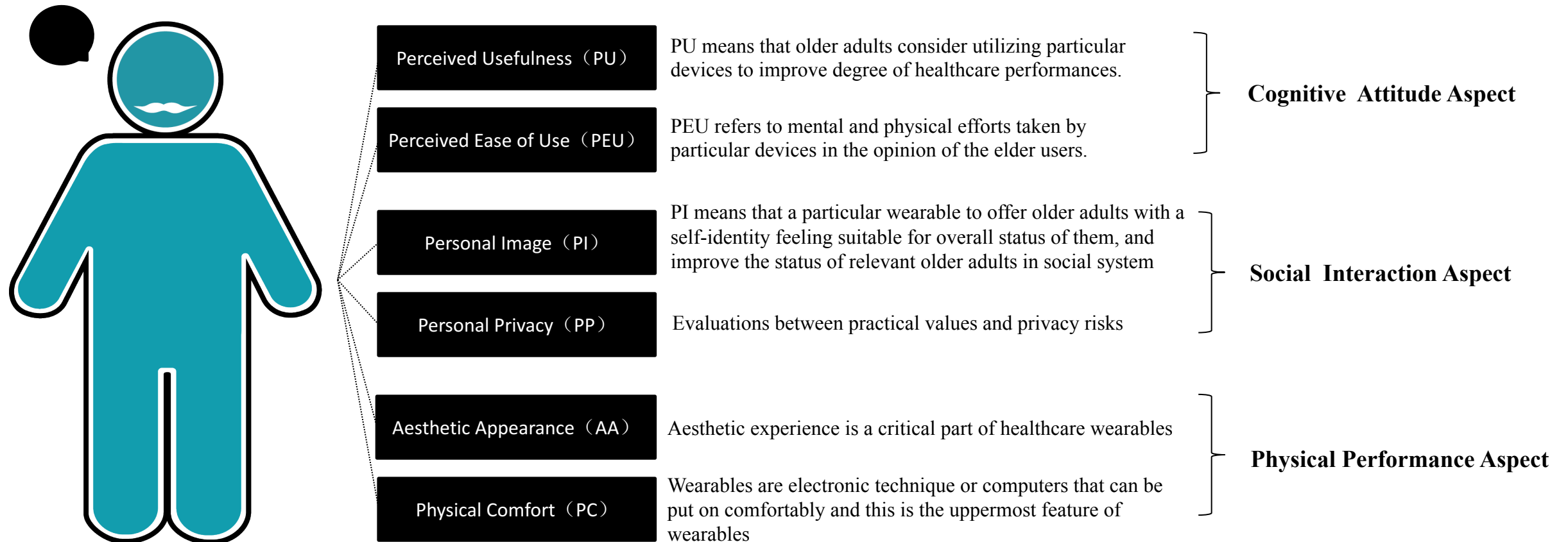
Fuzzy Product Positioning



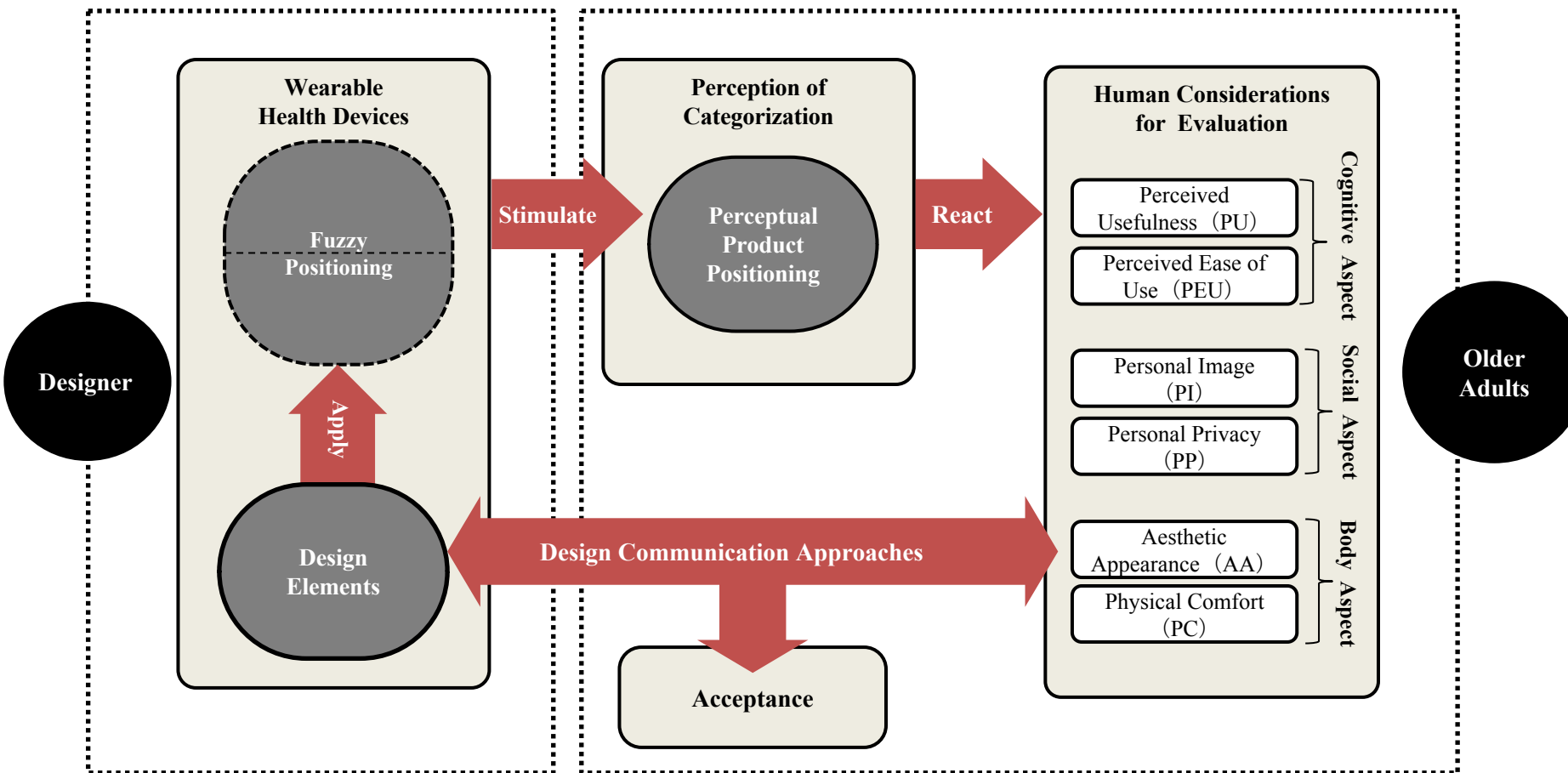
It can be inferred that different positioning of recent healthcare wearables would be generated from the previous experiences among older adults, as far as conflicts between new medical sensors inherent in the devices and the corresponding acquainted appearances of personal items.

Human Considerations to acceptability

We regard the interaction between older adults and healthcare wearables as an indirect user-designer communication process. In the literature part, we also find the there are six important human considerations from the user part, which have the potential to impact wearables acceptability.



Research Framework

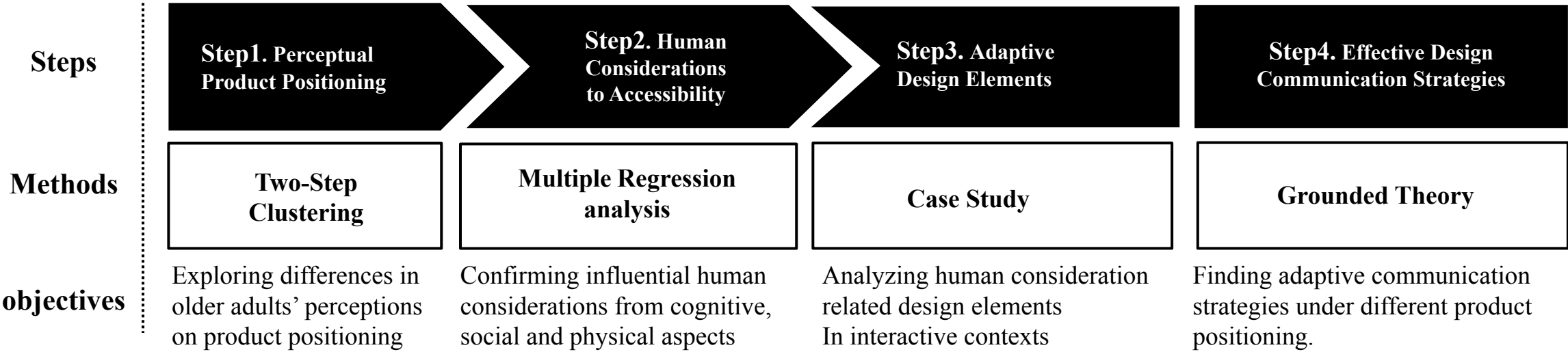


Three questions :

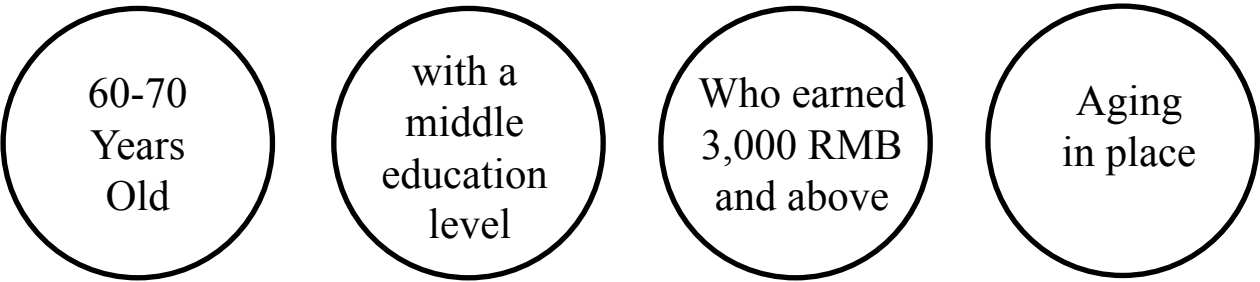
- Do older adults have different perception toward the positioning of recent healthcare wearables?
- What influences does the perceptual positioning have on human considerations on acceptance behavior?
- Which communication strategy should be adopt by designers to address the diverse positioning.

Method and Procedure

We combined both quantitative and qualitative method to find our answer.



Participants: Chinese urban older adults over 60 who are interested in the healthcare wearables but can find a favor one for themselves.



Quantitative Phase

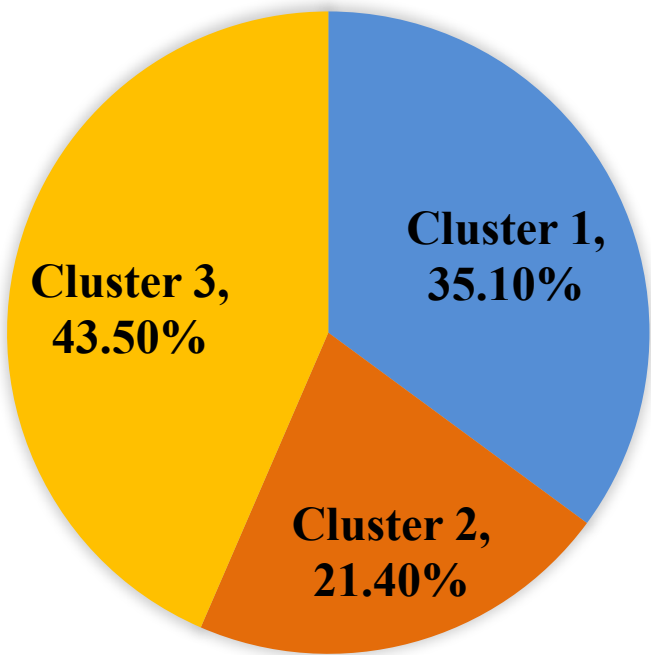
In quantitative phase, relevant data are collected here by questionnaires that should use scales with good reliability and validity in references as bases to the greatest extent.

Questionnaire surveys are also carried out to gather data and SPSS 24.0 is adopted to perform data analysis. The Cronbach's α value of 248 effective questionnaires as a whole is 0.90 (>0.70), and relevant results indicate that the KMO value is 0.87, sphericity test of Bartlett exhibits significant results ($p < 0.001$), which proves that the questionnaires surveys have preferable reliability and validity.

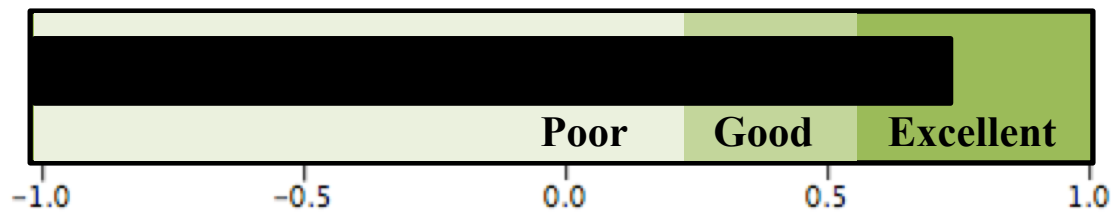
Positioning Perception (RP)	RP1. I deem this product as a medical tracker.
	RP2. I deem this product as a fashion accessory
Lifestyle Phase (LS)	LS1: How is your physical conditions?
	LS2: Do you exercise every day?
	LS3: What is the degree of social contact in your everyday life?
	LS4: I agree with fashion consumption.
Behavior Intention (BI)	LS5: I agree with technology consumption.
	BI1.If this product were available to me, I would use it.
	BI2.If this product were launched on the market at an affordable price, I would likely purchase it.
	BI3. I would use this product without being forced.
Perceived Usefulness (PU)	BI4. I would accept this product
	PU1. This product is very practical for me.
	PU2. This product could improve the quality of my health.
	PU3. This product could help me attach importance to my health.
Perceived Ease of Use (PEU)	PU4. This product could improve my performance of keeping healthy.
	PEU1. The operation of the product is clear and easy to understand.
	PEU2. I think this product is easy to use.
Personal Image (PI)	PEU3. I think this product is not complicated to use.
	PI1. I think this product would be suitable for me.
	PI2. I think this product would accord with my identity.
Personal Privacy (PP)	PI3. I think wearing this product would be a good experience.
	PP1. I'm worried about the product couldn't be properly protect my personal health information.
	PP2. I think the product would threaten my privacy.
Physical Comfort (PC)	PP3. I'm think the product can spill my personal information.
	PC1. I think this product would be comfortable.
	PC2. I would feel at ease when wearing this product.
Aesthetics appeal (AA)	PC3.I think this would be well suited to my body.
	AA1. I think the product is beautiful.
	AA2. I think using this product can bring good aesthetic experience.
	AA3. I like the appearance of this product.

Quantitative Phase

Clusters of Product Positioning



Quality of Two-step Cluster Analysis



Means of Positioning Perception Items			
Items	(Cluster 1) Tech-Aid Type	(Cluster 2) Fash-Acc Type	(Cluster 3) Fash-Tech Type
Medical Technology	4.30	1.73	4.46
Fashion Accessory	2.51	4.47	4.28
Means of Lifestyle Items			
Physical Condition	3.31	3.94	4.00
Daily Exercise	2.71	3.06	2.72
Social Contact	2.43	3.74	3.66
Fashion Consumption	2.41	4.02	3.75
Technology Consumption	3.74	2.83	3.58

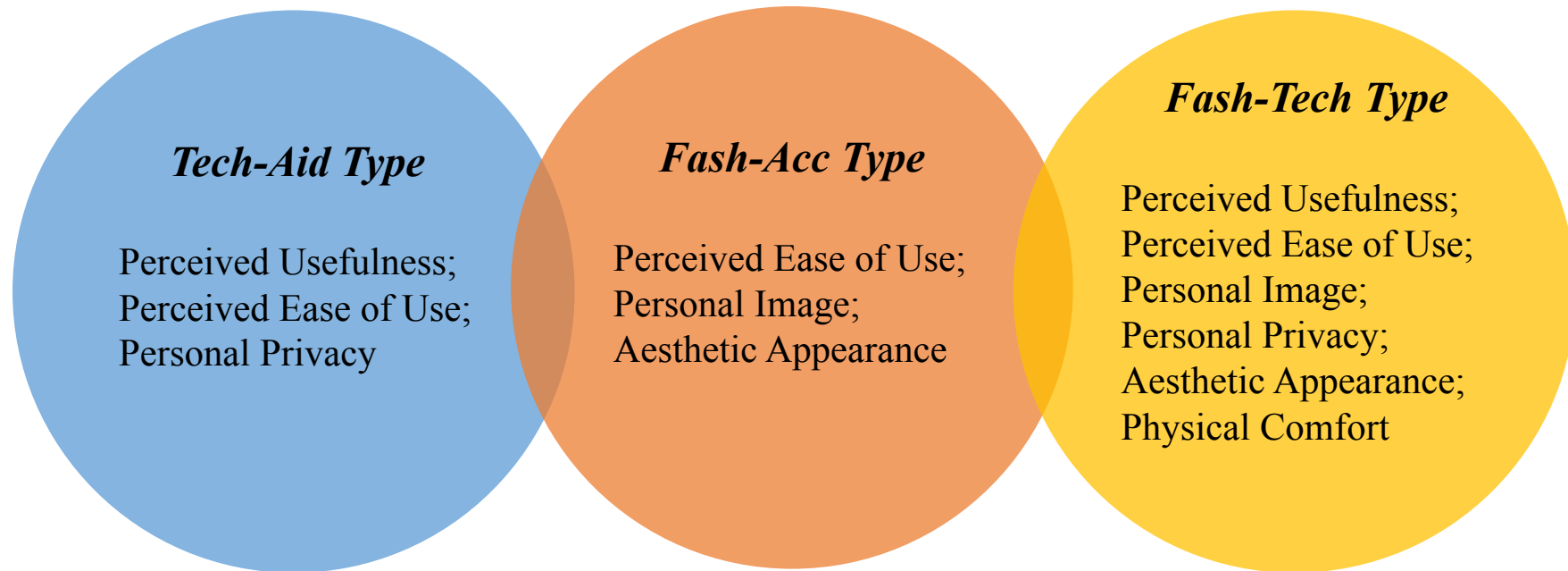
Quantitative Phase

In multiple regression analysis, this study pays much more attention to the potential influence relations between six human considerations.

Type		Tech-Aid (TA)	Fash-Acc (FA)	Fash-Tech (FT)
Sample Size		35.1% (n=87)	21.4% (n=53)	43.5% (n=108)
Adjusted R ²		0.522	0.630	0.652
β	Perceived Usefulness (PU)	0.668***	-0.129	0.207**
	Perceived Ease of Use (PEU)	0.260**	0.297*	0.379***
	Personal Image (PI)	0.010	0.334**	0.199**
	Personal Privacy (PP)	0.265**	-0.092	0.161*
	Physical Comfort (PC)	-0.156	0.115	0.215*
	Aesthetic Appearance (AA)	-0.160	0.418**	0.228**

The coefficients of three regression equations are all greater than 0.50. Which signified a good quality. For Tech-aid type, PU, PEU and PP are significantly related to acceptance behaviors. For Fash-Acc type, factors significantly related to acceptance behaviors are PEU, PI and AA. For Fash-Tech type positioning, all the six factors are significantly associated with acceptance behaviors of older adults.

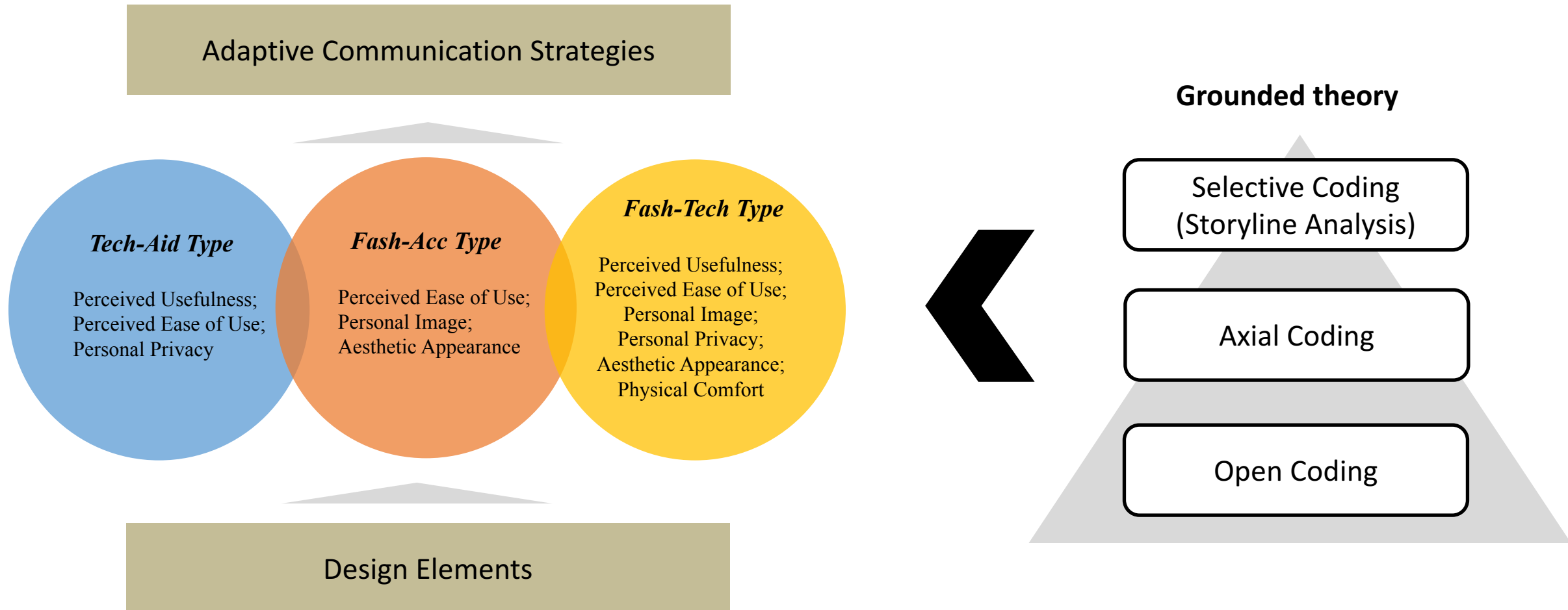
Quantitative Phase



We speculate that older adults have different human consideration as far as different positioning perception are considered.

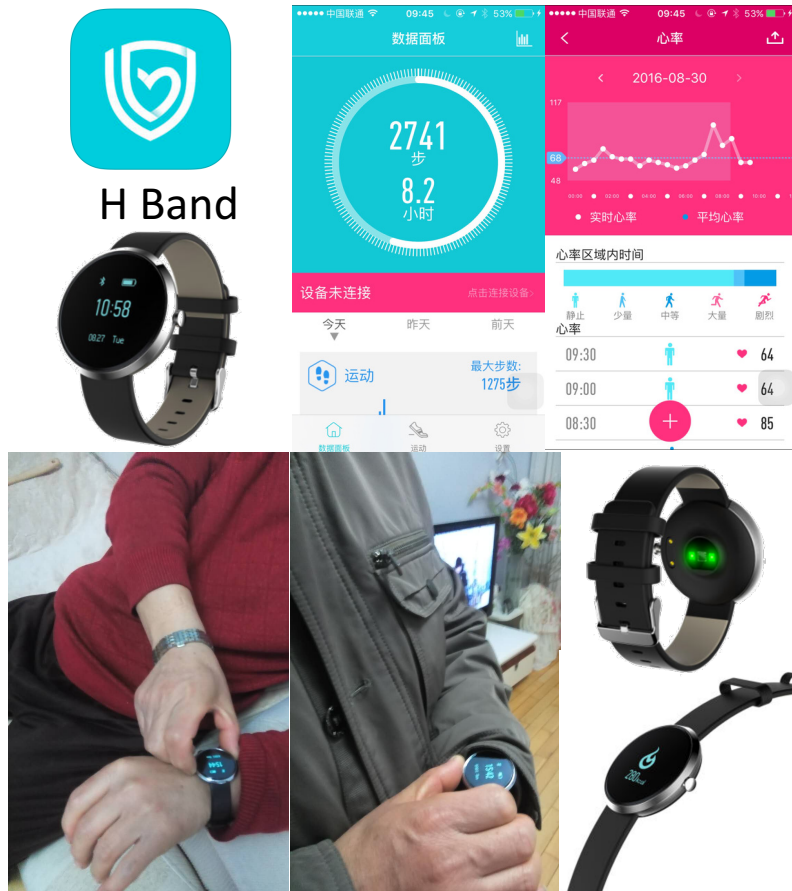
Qualitative phase

Case study was used in qualitative phase base on grounded theory, which means we deconstruct data into open coding, axial coding and at last selective coding, we also call it storyline analysis of interactive contexts.



Case Study

We trace back to 15 older participants with different positioning recognition in the questionnaire test, then let them experience the sample healthcare wearable sample. Then three coders reconstruct the full picture of possible design communication. And QSR Nvivo 11 was used as a tool for data processing.

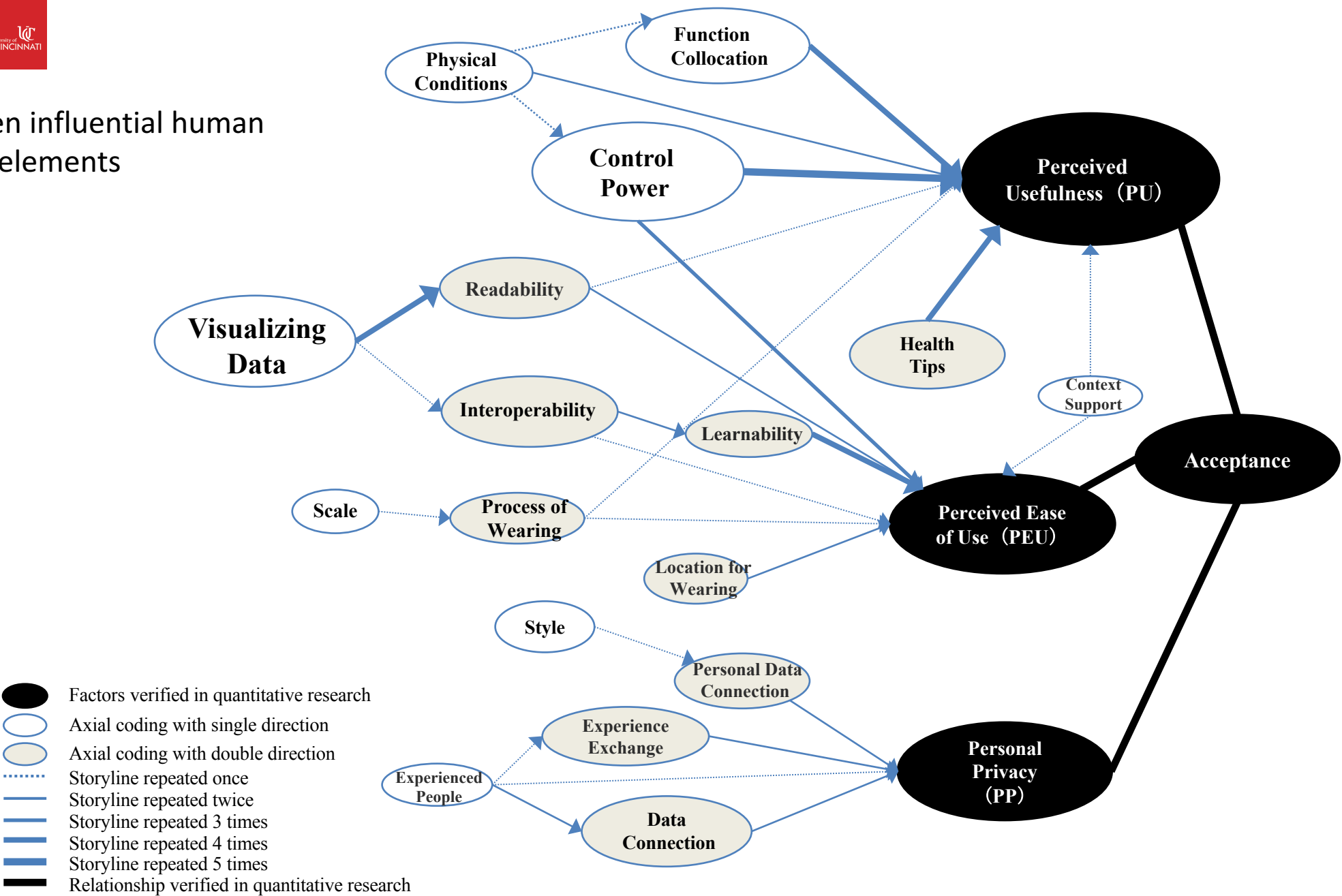


No.	Question phases and implementation procedures
01	Living habits and customs, daily routine, and interest or hobby.
02	How to take care of their health? What kind of products do they use.
03	Which sorts of health data do they pay attention to , and how to use them?
04	Researchers introduce the wearable health product (stimulus materials) and demonstrate the operation procedure of the relevant service.
05	Older Adults experience stimulus materials practically.
06	Older adults talk about the overall feeling of using the product.
07	Older adults talk about the reasons that can affect the human factors for evaluation
08	Opinions and Suggestions for the healthcare wearables.

Storyline Analysis in Tech-Aid Type

Interactive Context between influential human considerations and design elements

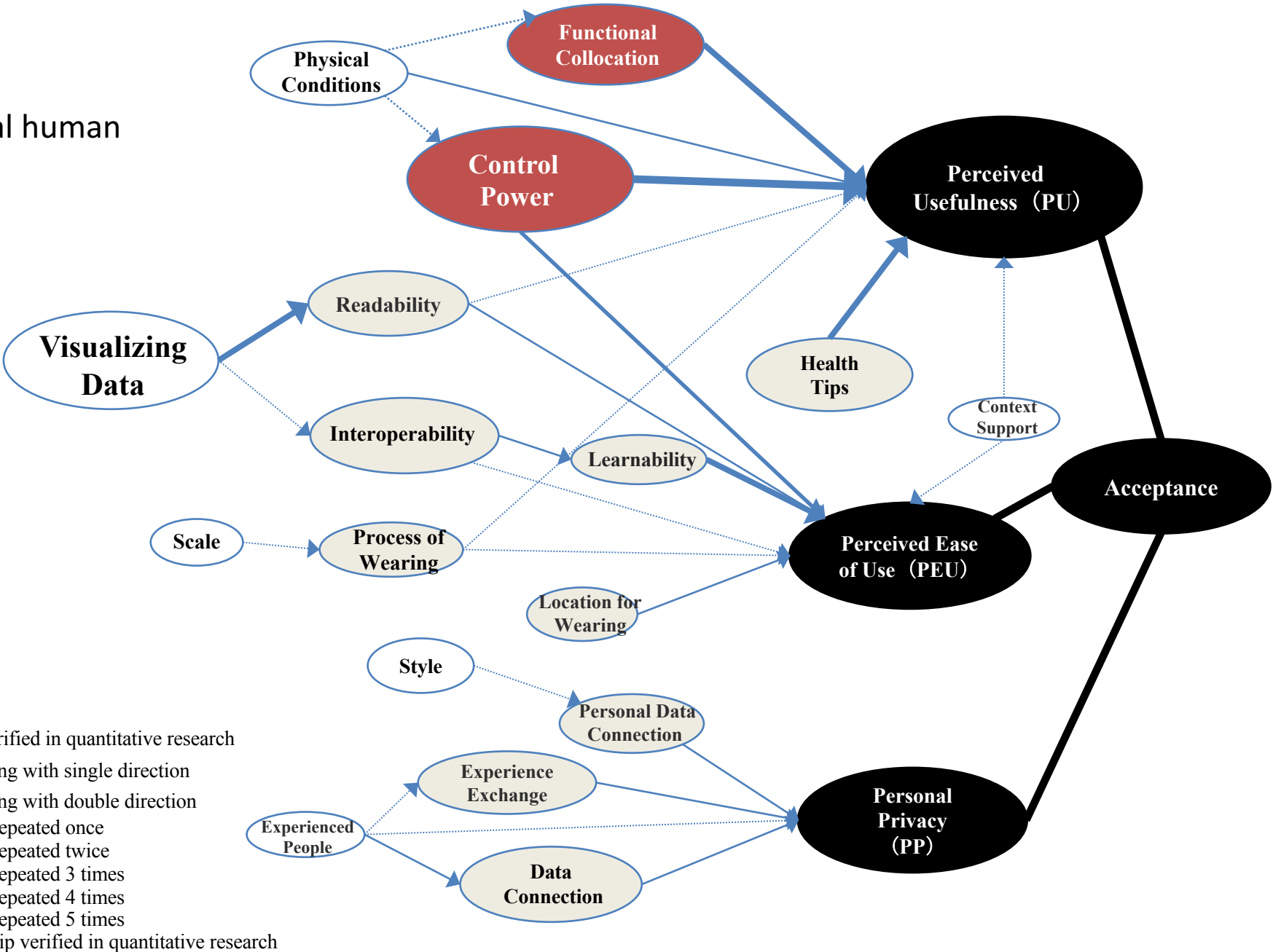
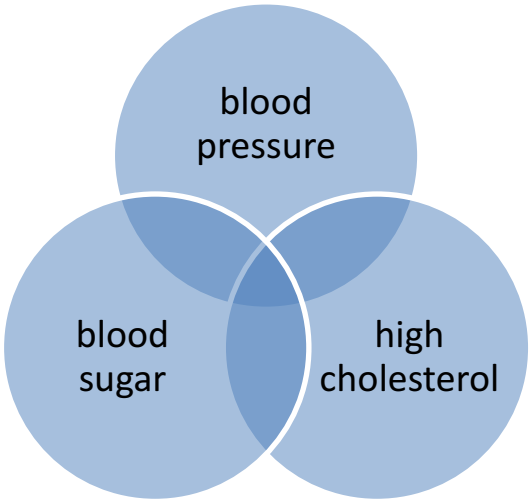
Encoding came from five interviewees. In total, 95 free nodes were sorted out and then used as the open codes converged into 21 axial codes.



Storyline Analysis in Tech-Aid Type

Interactive Context between influential human considerations and design elements

Priority to control power;
Fit symptoms



Storyline Analysis in Tech-Aid Type

Interactive Context between influential human considerations and design elements

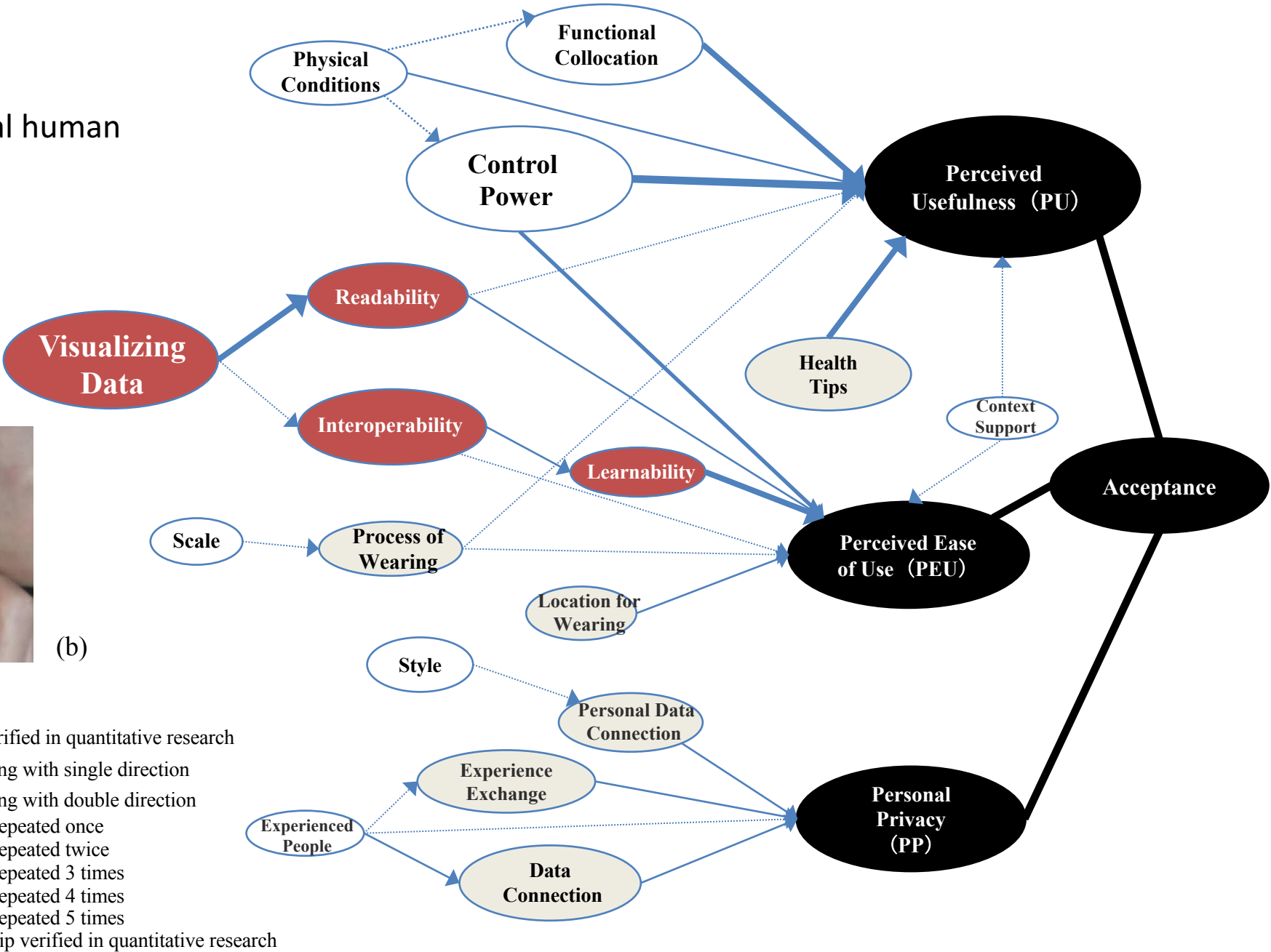
Friendly learning; Straightforward



(a)



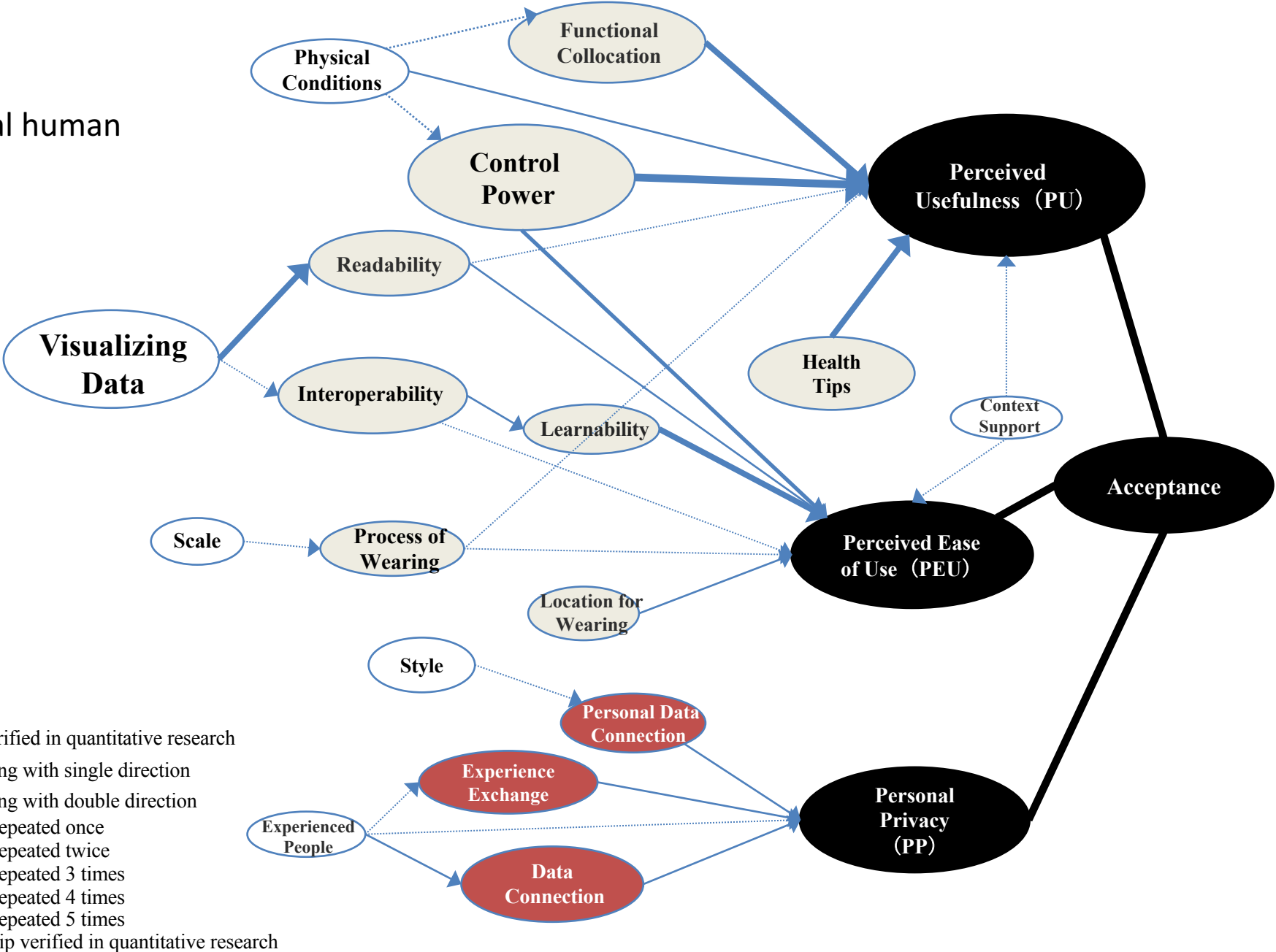
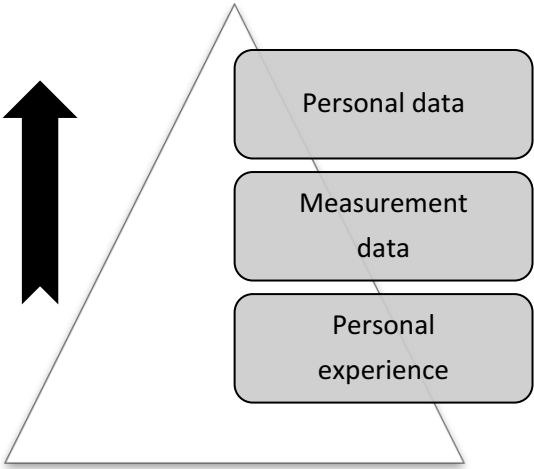
(b)



Storyline Analysis in Tech-Aid Type

Interactive Context between influential human considerations and design elements

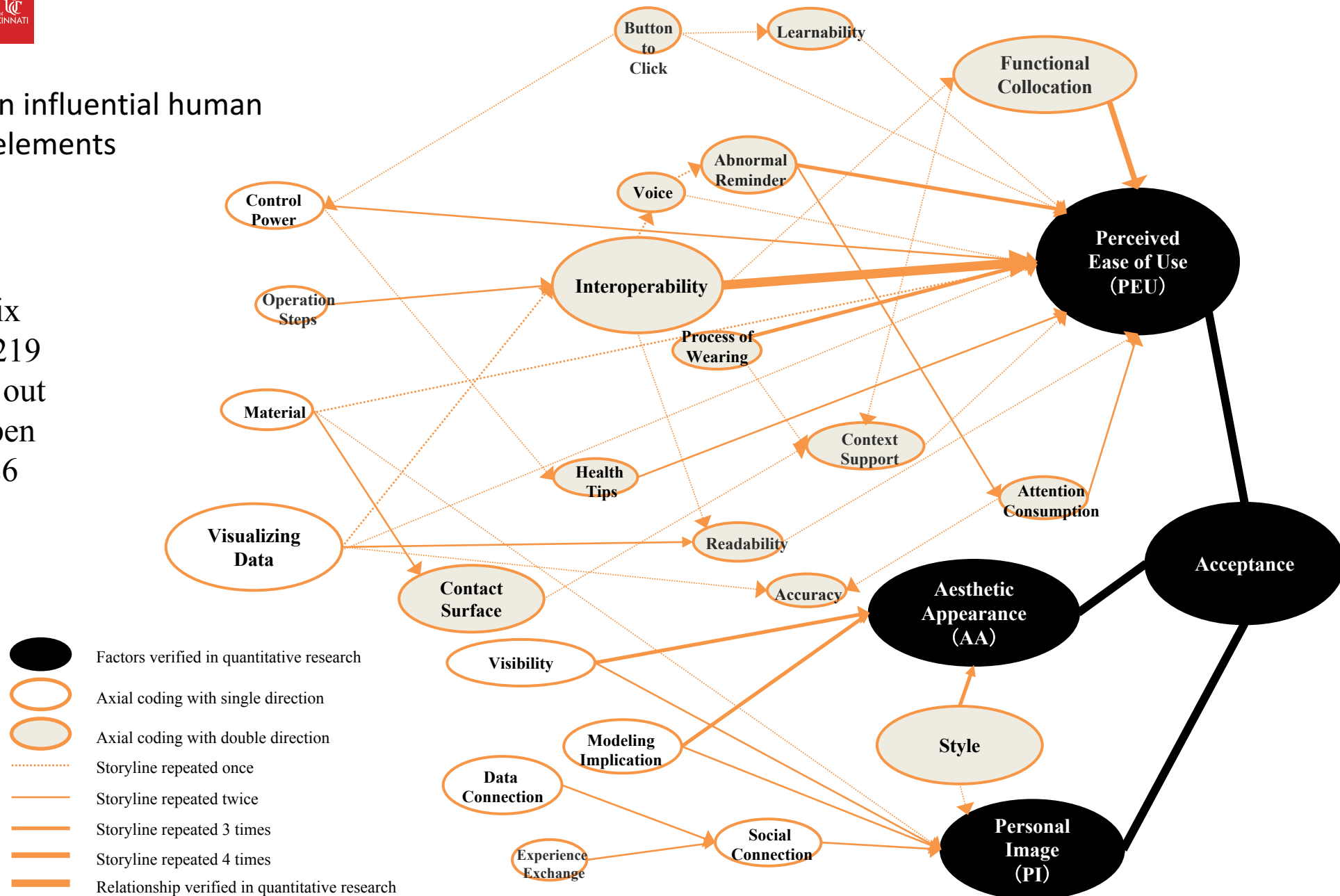
Information hierarchy;
Cautious interconnection



Storyline Analysis in Fach-Acc Type

Interactive Context between influential human considerations and design elements

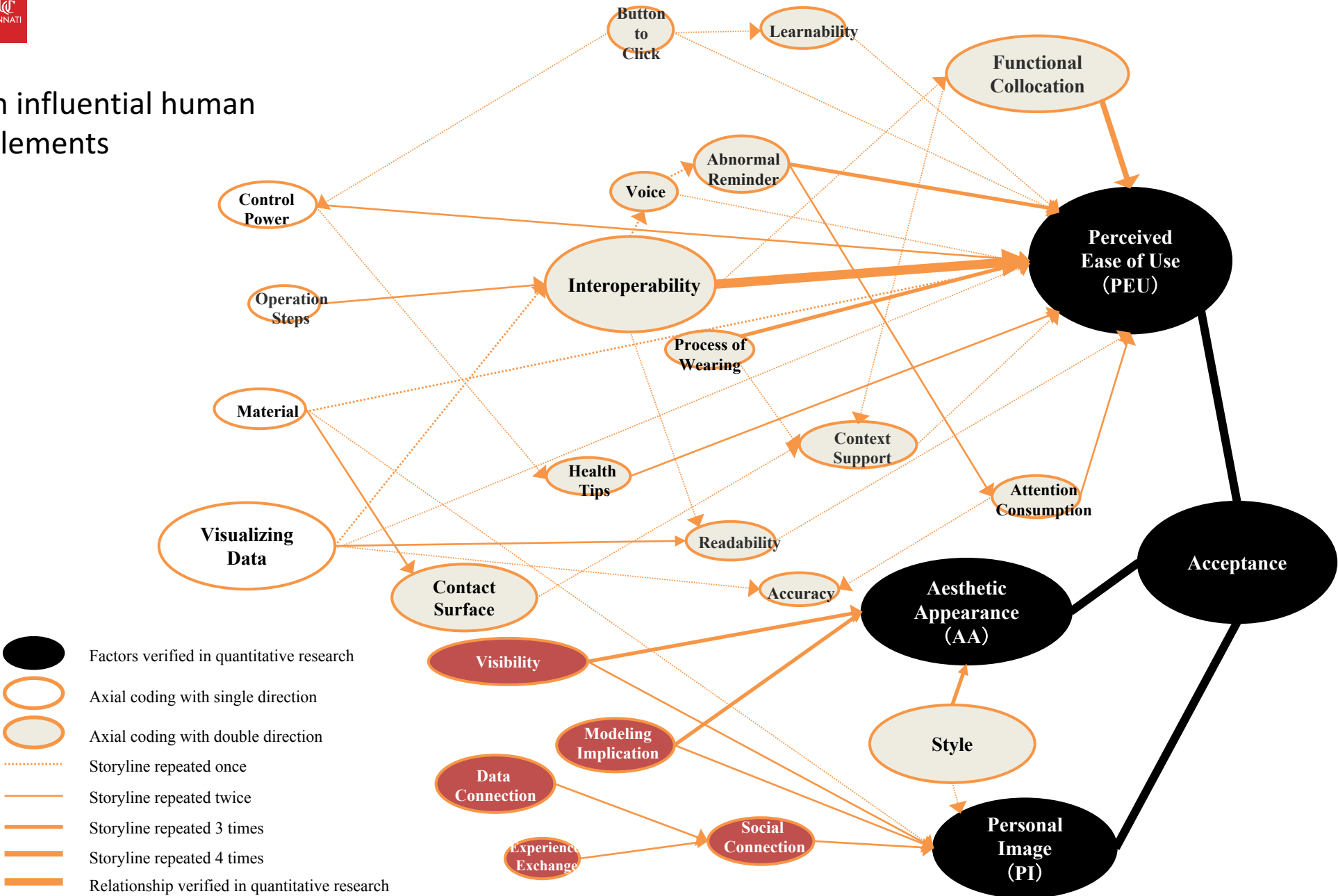
Encoding came from six interviewees. In total, 219 free nodes were sorted out and then used as the open codes converged into 26 axial codes.



Storyline Analysis in Fach-Acc Type

Interactive Context between influential human considerations and design elements

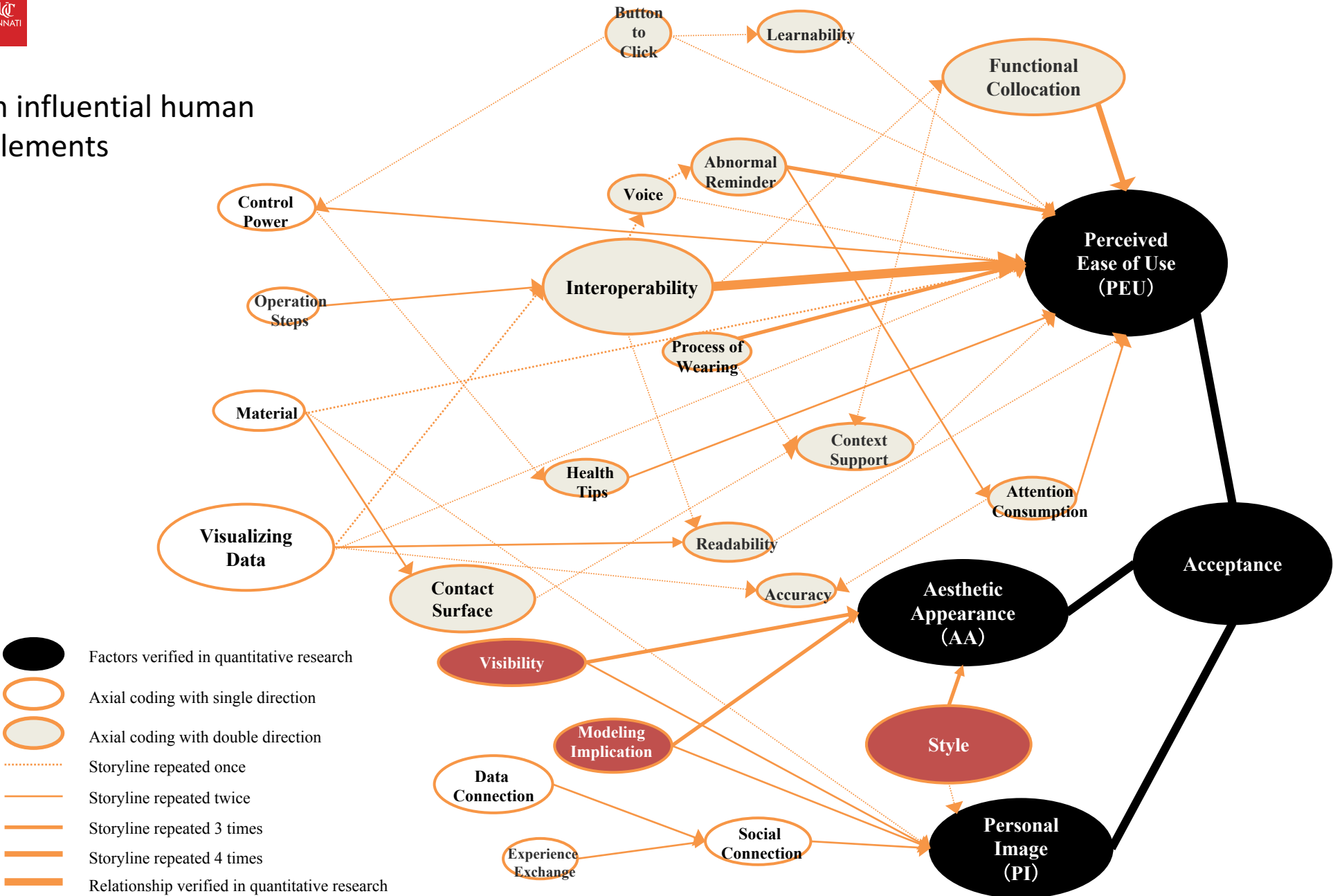
Thinking about modeling;
Concealing stigma.



Storyline Analysis in Fach-Acc Type

Interactive Context between influential human considerations and design elements

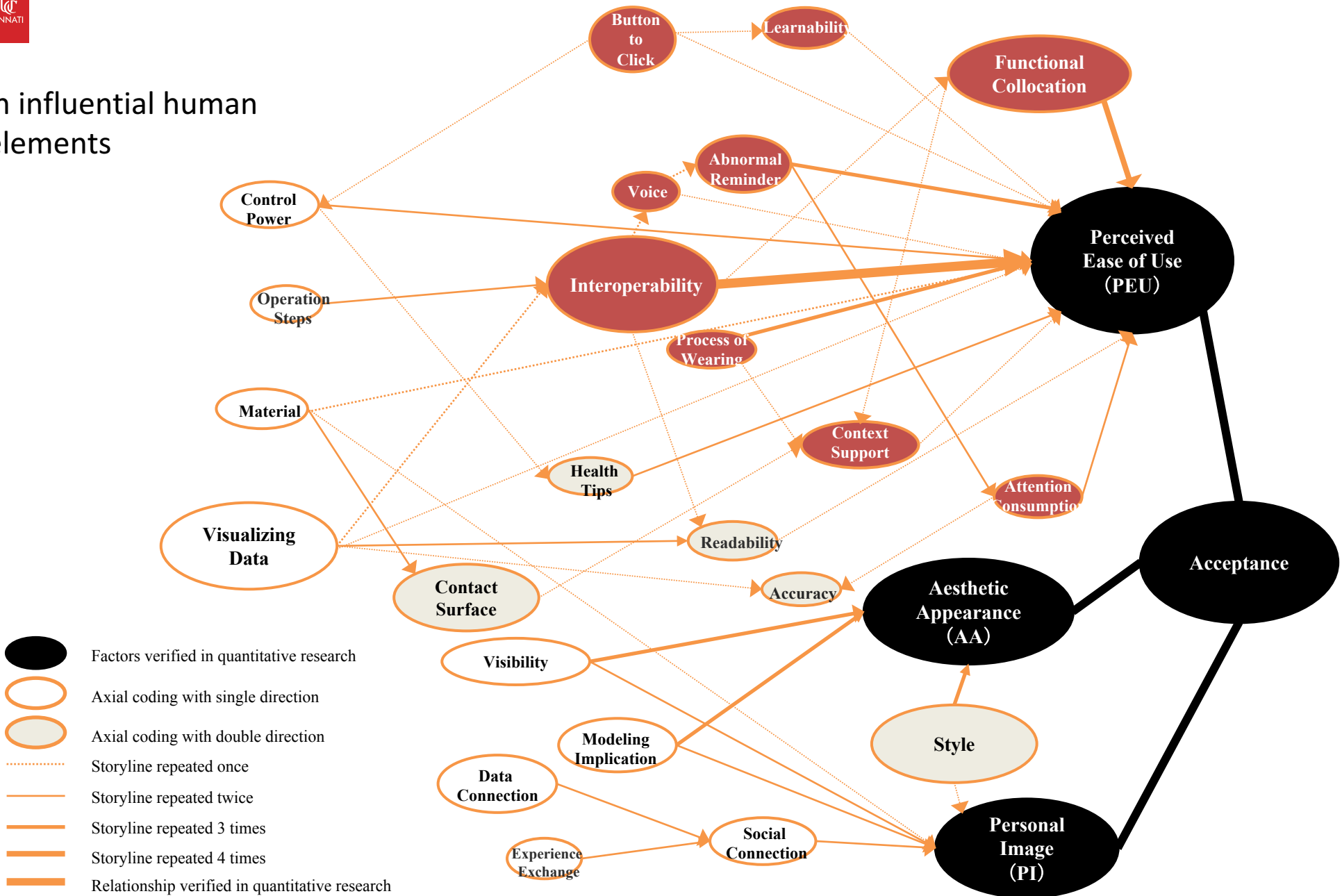
Modeling style, Agreeing with aesthetic appreciation.



Storyline Analysis in Fach-Acc Type

Interactive Context between influential human considerations and design elements

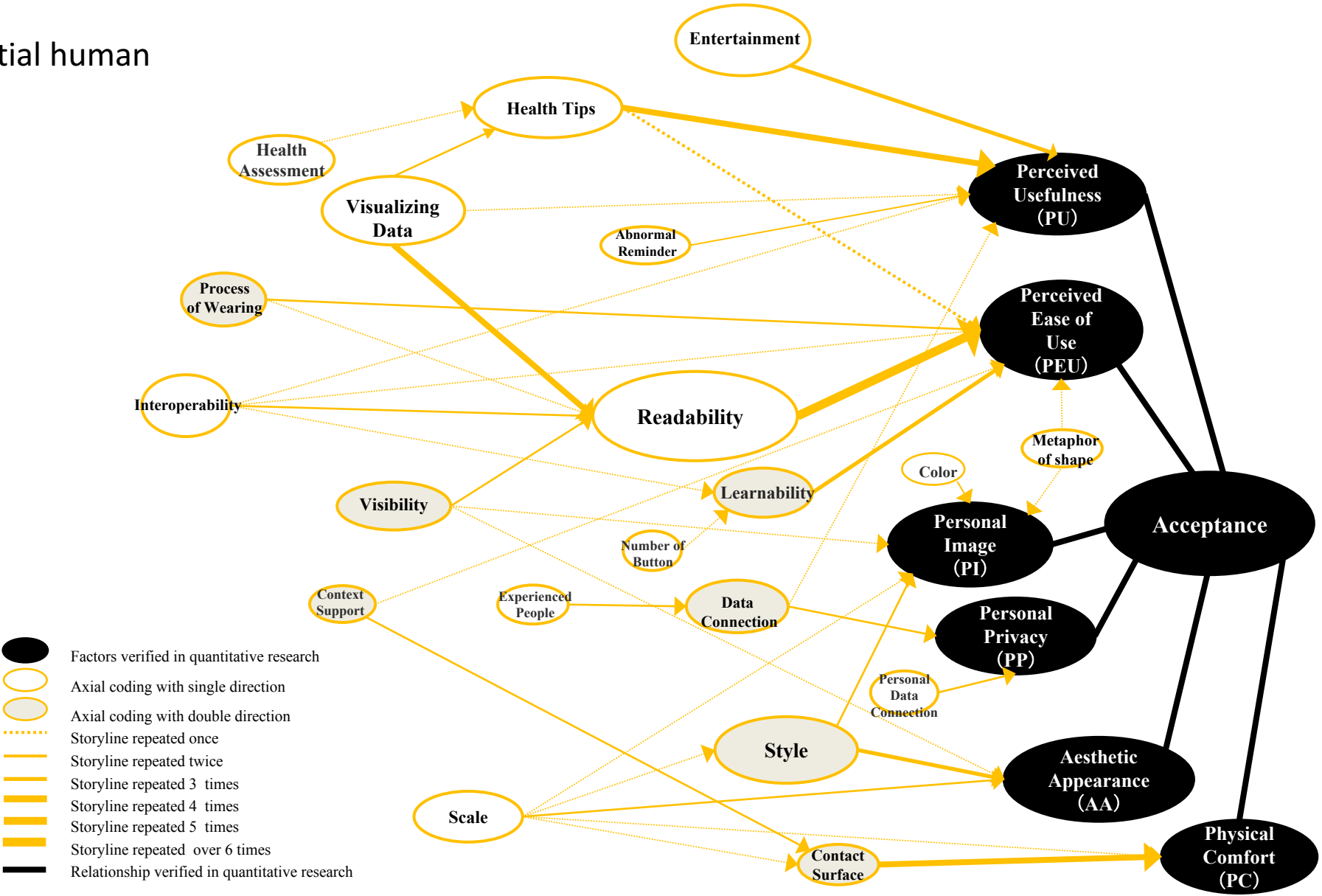
Simplified operation;
 Popping on and off at will.



Storyline Analysis in Fach-Tech Type

Interactive Context between influential human considerations and design elements

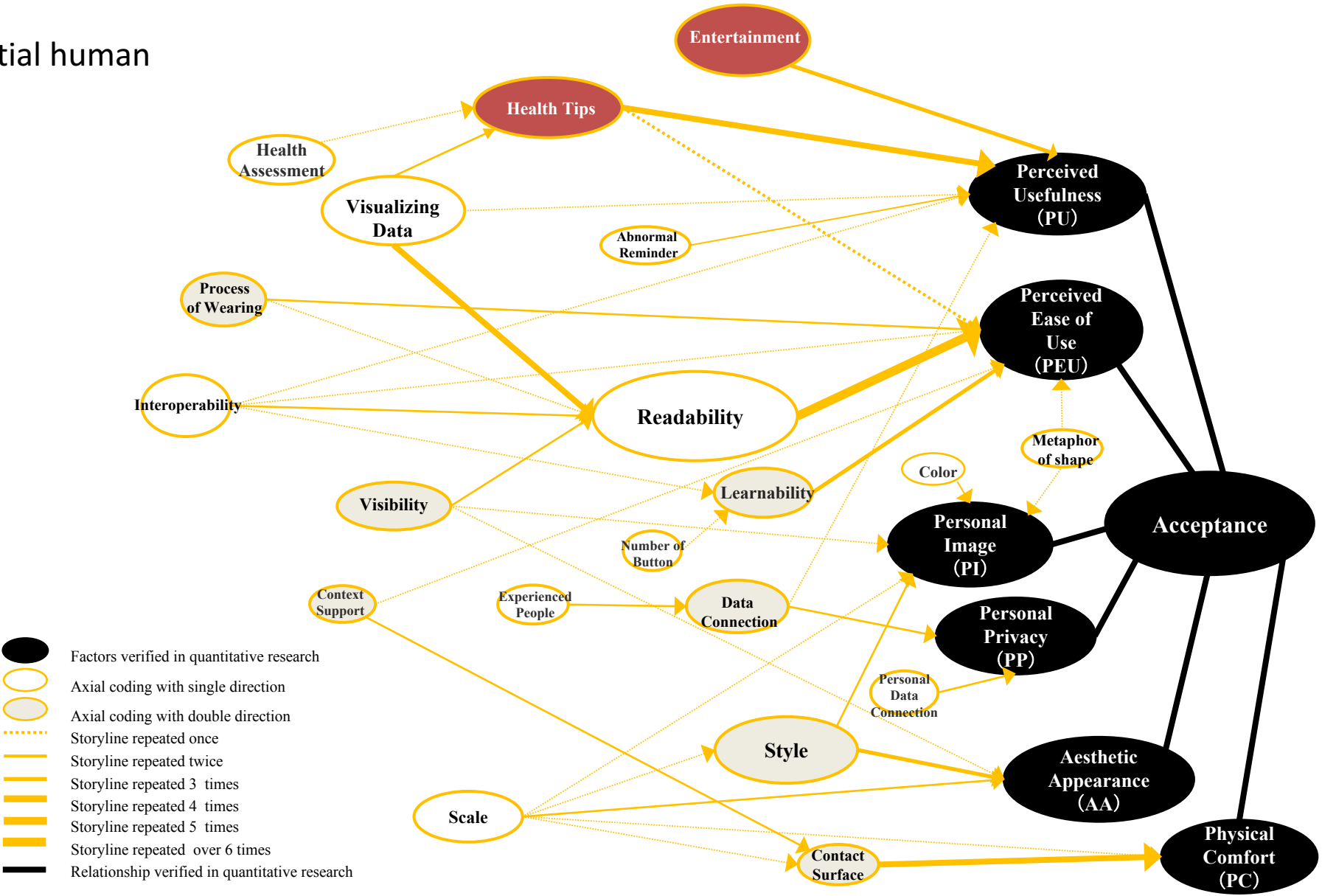
Encoding four interviewees. In total, 170 free nodes were sorted out and then used as the open codes converged into 25 axial codes.



Storyline Analysis in Fach-Tech Type

Interactive Context between influential human considerations and design elements

Data insights;
Entertainment complementary.



Storyline Analysis in Fach-Tech Type

Interactive Context between influential human considerations and design elements

Visual data to reduce interferences.



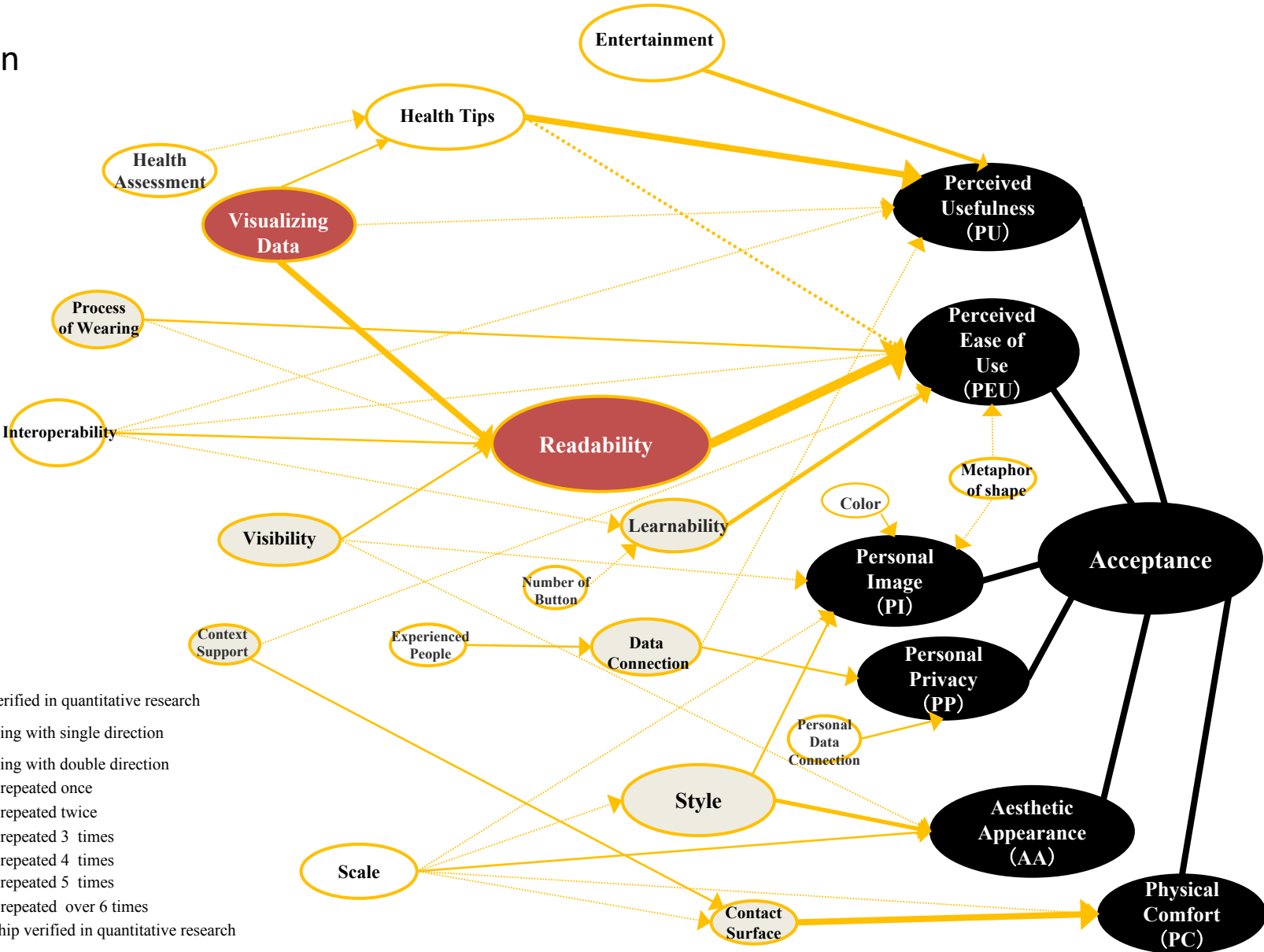
(a)



(b)



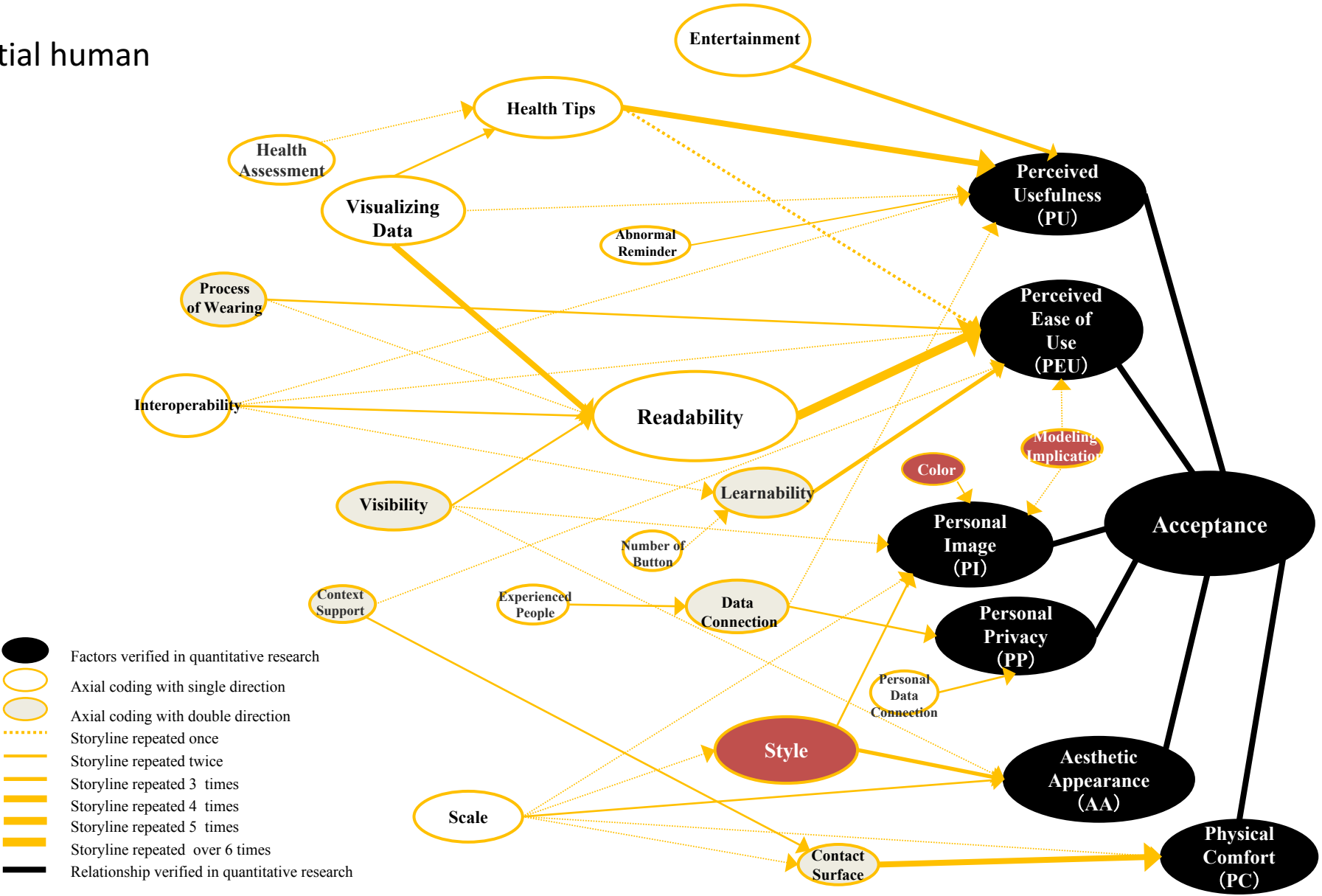
(c)



Storyline Analysis in Fach-Tech Type

Interactive Context between influential human considerations and design elements

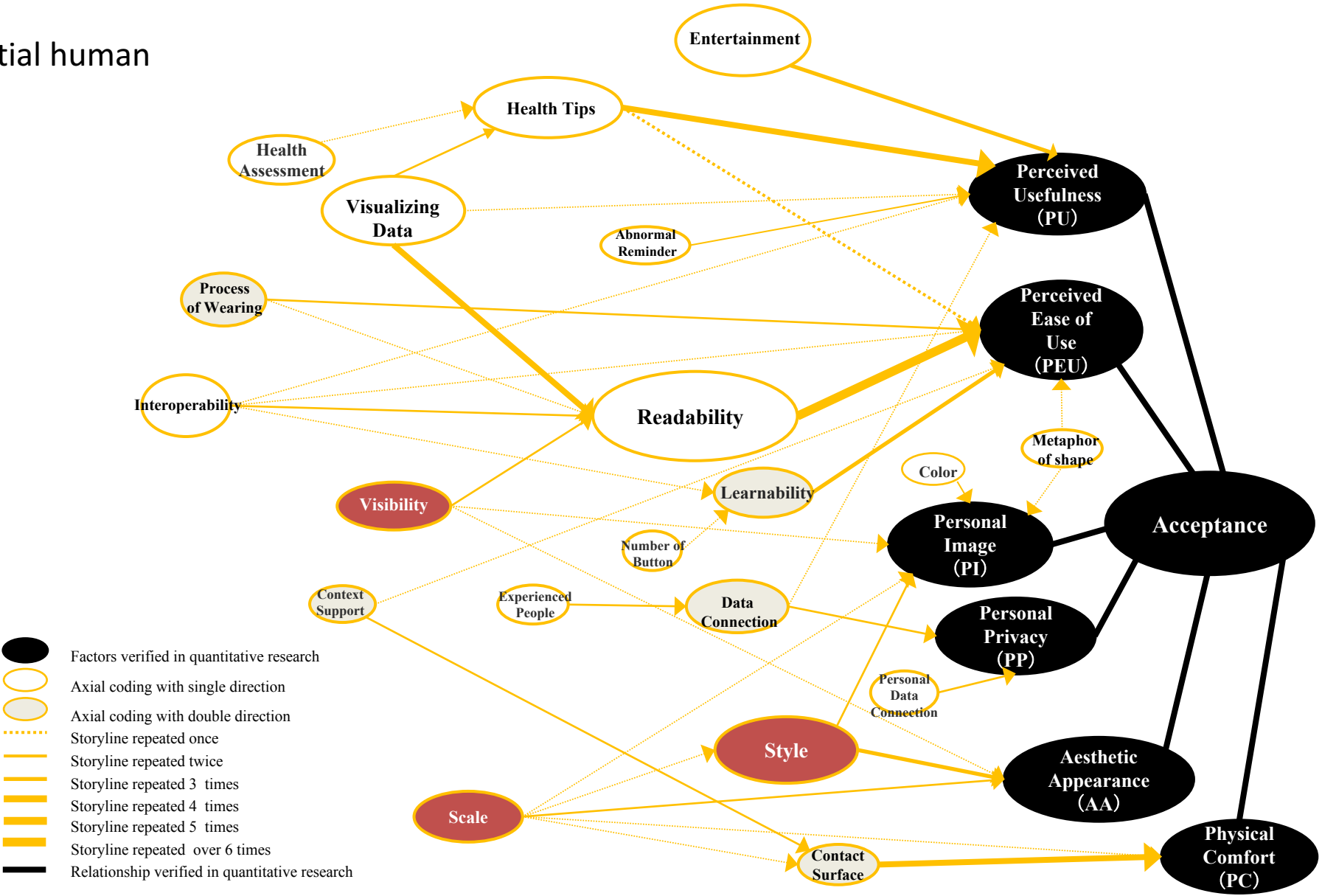
Style modality;
Appropriate display.



Storyline Analysis in Fach-Tech Type

Interactive Context between influential human considerations and design elements

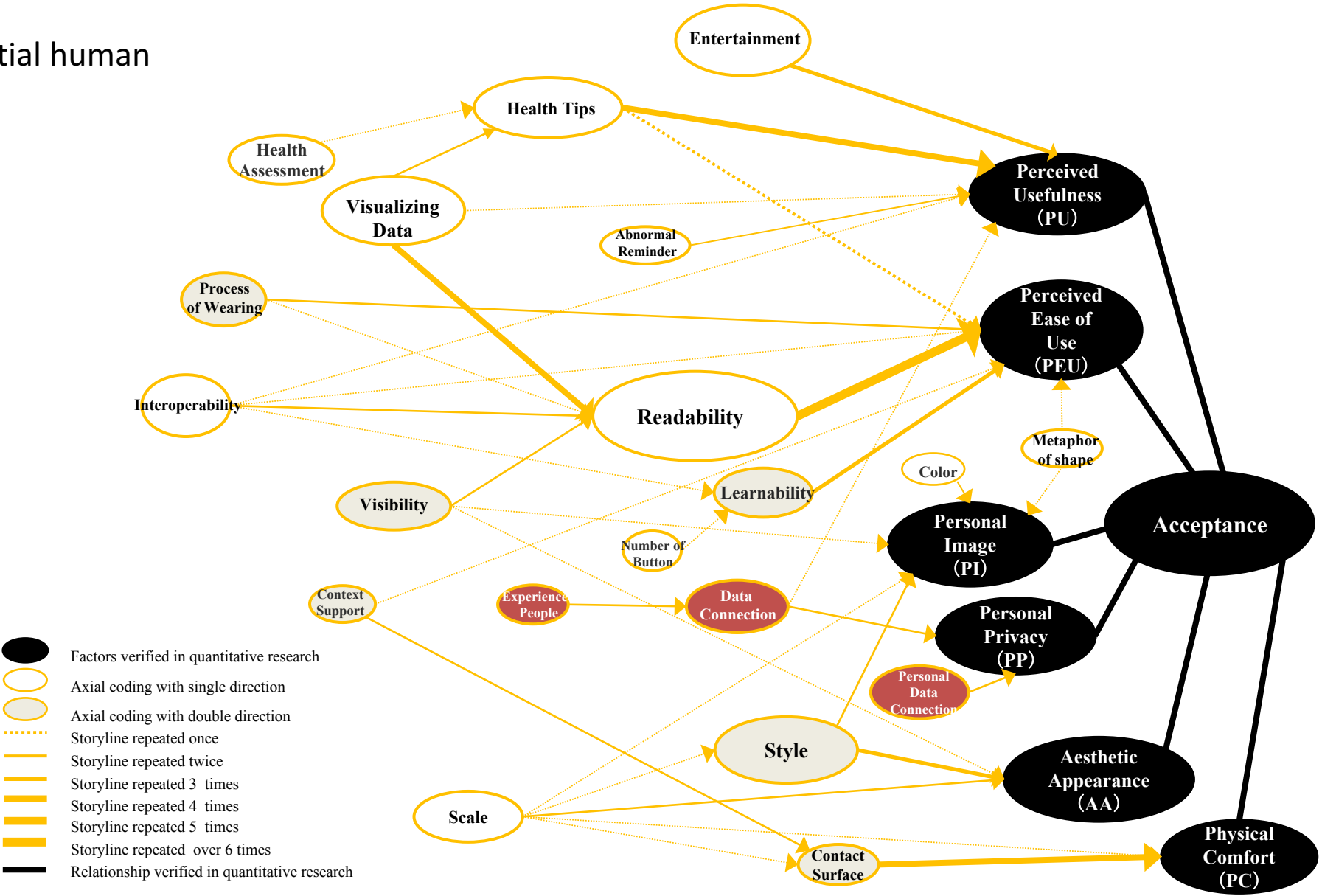
Appropriate size;
Proper style.



Storyline Analysis in Fach-Tech Type

Interactive Context between influential human considerations and design elements

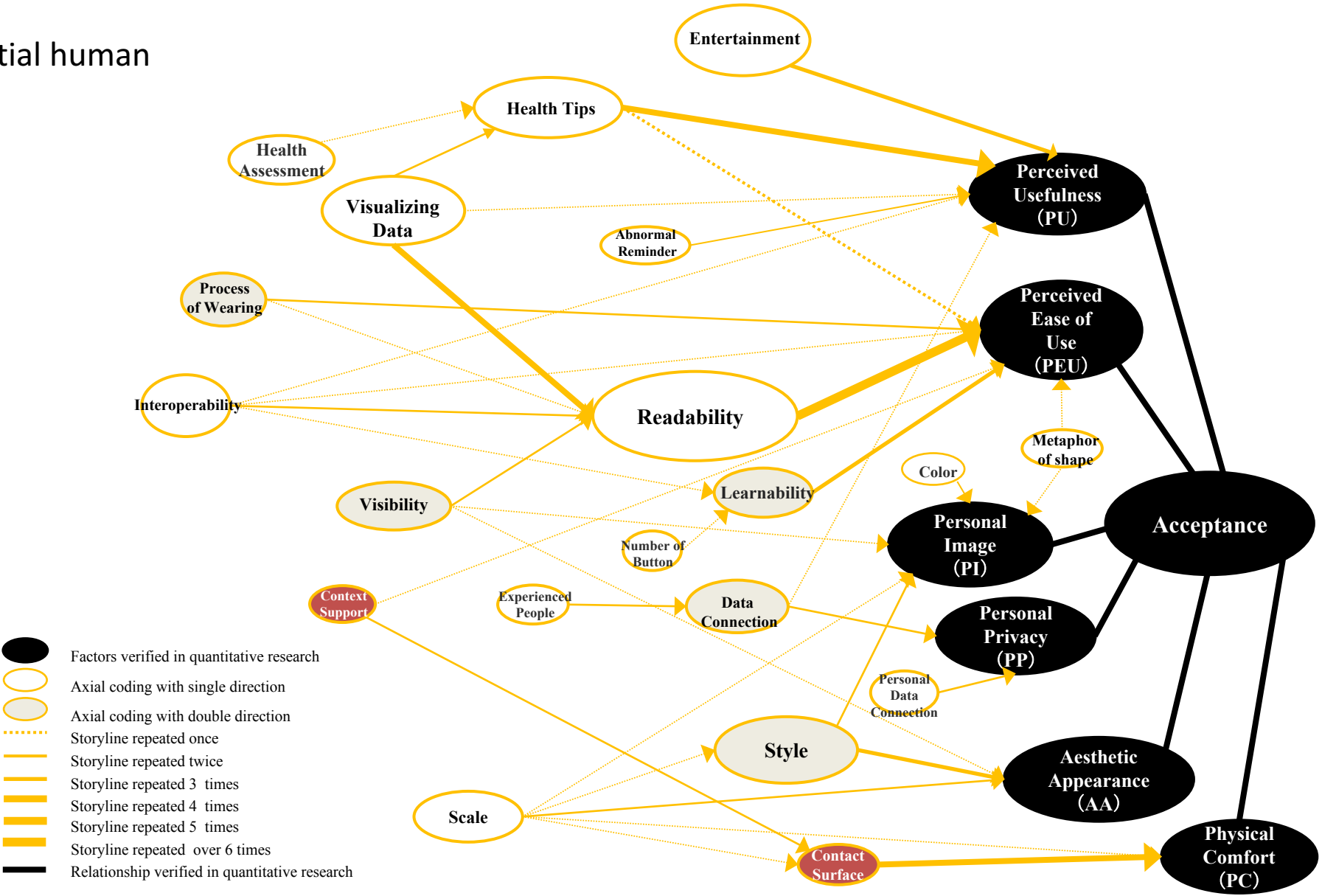
Professional people;
Data association.



Storyline Analysis in Fach-Tech Type

Interactive Context between influential human considerations and design elements

Context fusion;
Contact comfort.

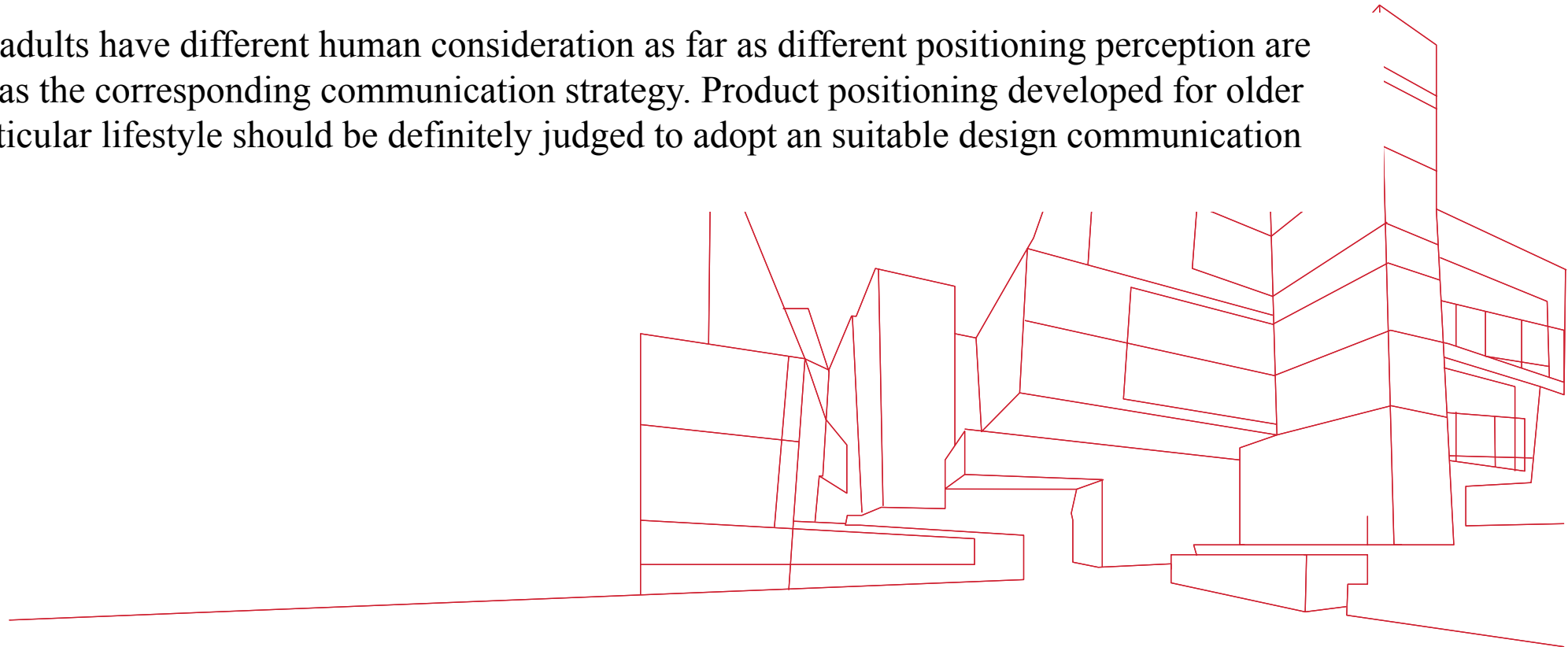


Discussion — — Design Communication Strategies and their guidelines

	Tech-Aid Type	Fash-Acc Type	Fash-Tech Type
Perceived Usefulness	Priority to control power; Fit symptoms	——	Data insights; Entertainment complementary
Perceived Ease of Use	Friendly learning; Straightforward	Simplified operation; Popping on and off at will	Visual data to reduce interferences
Personal Image	——	Thinking about modeling; Concealing stigma	Style modality; Appropriate display
Personal Privacy	Information hierarchy; Cautious interconnection	——	Professional people; Data association
Physical Comfort	——	——	Context fusion; Contact comfort
Aesthetic Appearance	——	Modeling style; Agreeing with aesthetic appreciation	Appropriate size; Proper style
	Calm Communication Strategy	Active Communication Strategy	Persuasive Communication Strategy

Conclusion — Design Communication Strategies

- First, older adults' perceptions on product positioning of devices are classified into three types, including Tech-Aid type, Fash-Acc type and Fash-Tech type. In addition, these diverse types of product positioning correspond to older adults with various lifestyles.
- Second, older adults have different human consideration as far as different positioning perception are considered so as the corresponding communication strategy. Product positioning developed for older adults in a particular lifestyle should be definitely judged to adopt an suitable design communication strategy.



**Thank you for your
attention !**

