





HSJCC - 7 March 2019

Cognitive Communication, Language, and the Law: Findings from and Implications for Individuals with Traumatic Brain Injury

Joseph Wszalek, JD, PhD
School of Nursing, University of Wisconsin-Madison

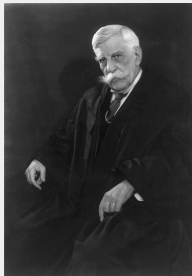
Disclaimers

My (legal) opinions are mine and
mine alone

I have no conflicts of interest to
report

Introduction

Disability in the legal system (1919)



https://upload.wikimedia.org/wikipedia/commons/4/40mh/1905/Oliver_Wendell_Holmes_Jr.jpg
https://www.flickr.com/photos/oliver_holmes_jr/4400000000/
https://www.flickr.com/photos/oliver_holmes_jr/4400000000/

Oliver Wendell Holmes, Jr. (1841 – 1935)
American jurist and renowned legal scholar

Introduction

Disability in the legal system (1919)

“The law considers, in other words, what
would be blameworthy in the average
man, the man of ordinary intelligence
and prudence, and determines liability
by that. If we fall below the level in those
gifts, it is our misfortune”

- Oliver Wendell Holmes Jr., *The Common Law*

Introduction

Disability in the legal system (1919)

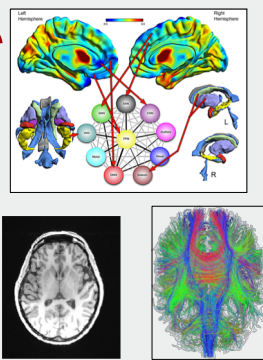
Normative Legal Standards
+
Individual's "intelligence and
prudence"
||
Outcomes ("Liability")

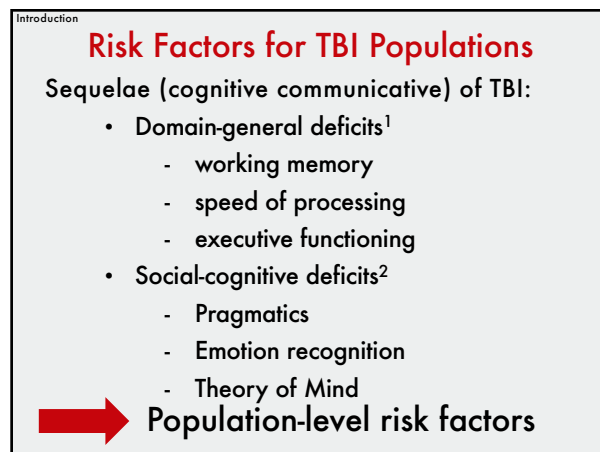
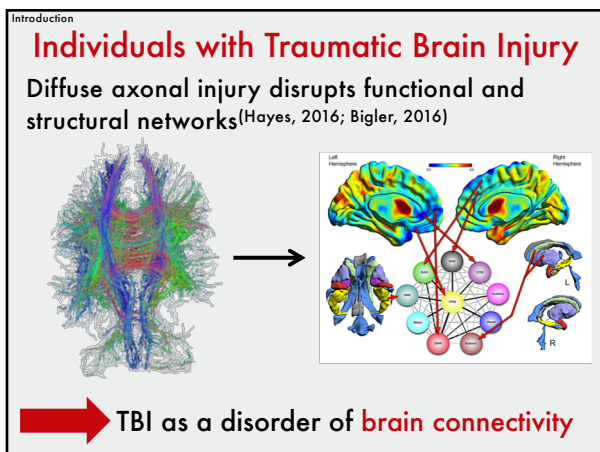
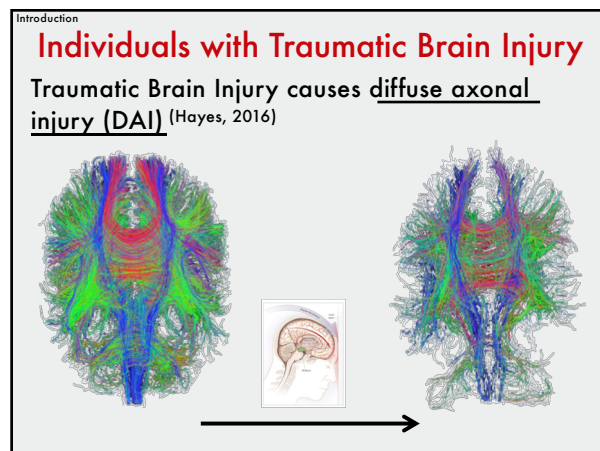
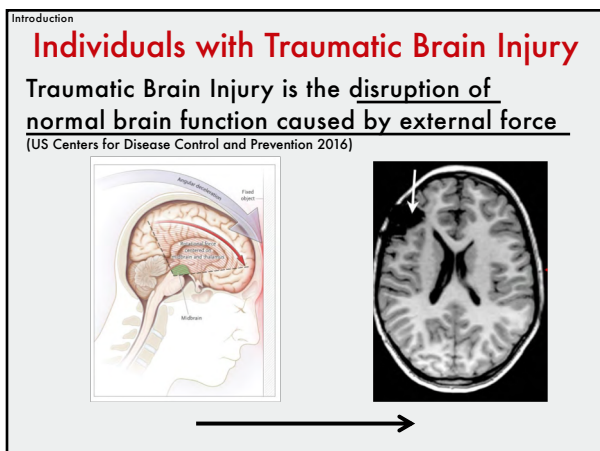
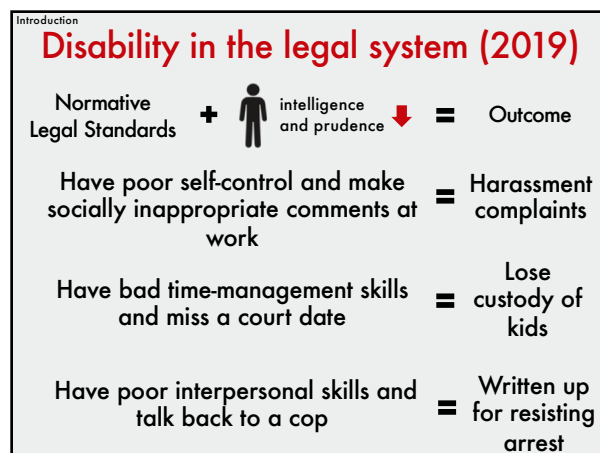
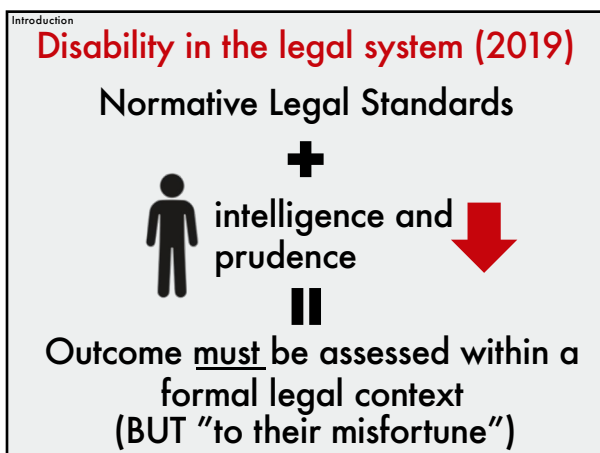
Introduction

Disability in the legal system (2019)

Disability in the legal system (1919)

Normative Legal Standards
+
Individual's "intelligence and
prudence"
||
Outcomes ("Liability")



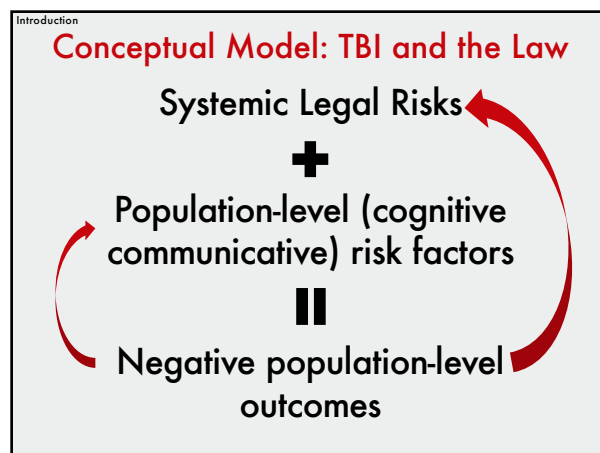


Legal Outcomes for TBI Populations

Outcomes of TBI include:

- Overrepresentation in incarcerated populations (30-50%)³
- Social determinants that are themselves risk factors for legal outcomes⁴
 - loss of employment
 - loss of social relationships

➡ Negative population-level outcomes

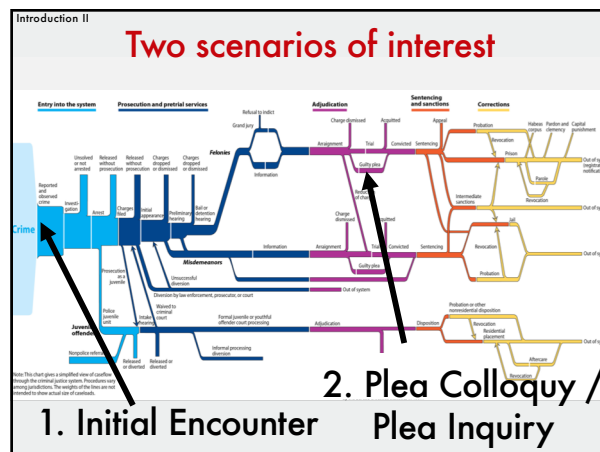
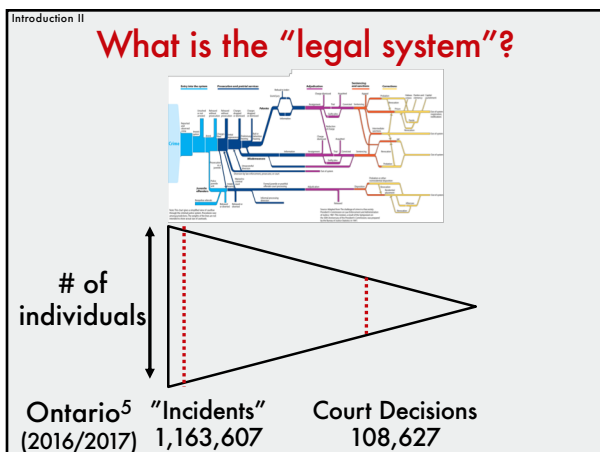
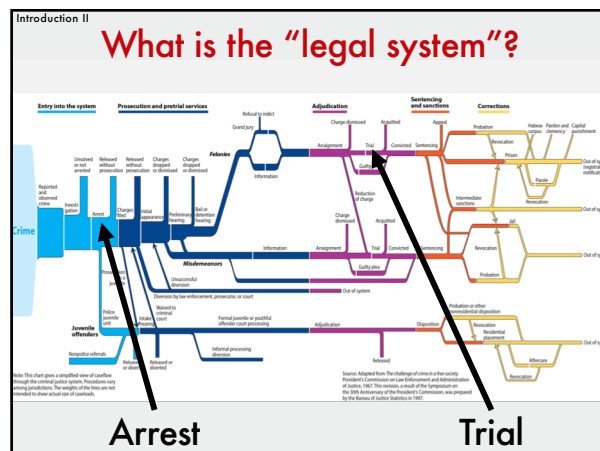


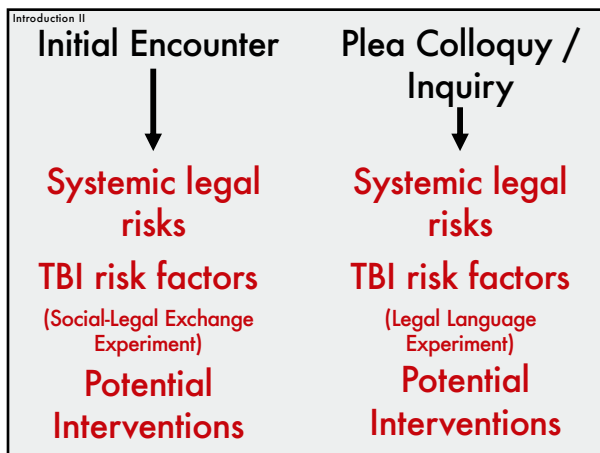
Talk Objective

Q1 What cognitive communication-based features of the legal system may engender systemic risks?

Q2 What are the relationships between these systemic risks and individuals with TBI?

Q3 What are possible interventions to ameliorate these systemic risks?





Four Caveats to keep in mind

Caveat # 1

TBI ≠ Criminality

Caveat # 2

These issues are not limited to criminal law (or to law)

Caveat # 3


These issues are not uniquely American

Caveat # 4

There just aren't good solutions to some of these challenges

Scenario One

Initial Encounters and Social-Legal Exchange Reasoning



"I wouldn't—there's an awful lot of scary-sounding legalese."

1. Initial Encounter and Social-Legal Exchanges

What is an "initial encounter"?

Any initial interaction between a lay individual and an agent of the legal system (law-enforcement officer, attorney, etc.)

➔ Agent serves as "gatekeeper" to legal system

↳ Imposes weight of, or allows access to, legal system

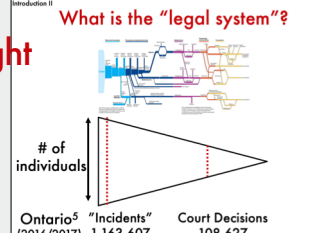
1. Initial Encounter and Social-Legal Exchanges

What is an "initial encounter"?

Imposes weight of, or allows access to, legal system

Introduction II

What is the "legal system"?



Ontario ⁵	"Incidents" (2016/2017)	Court Decisions
	1,163,607	108,627

1. Initial Encounter and Social-Legal Exchanges

What are the (cognitive communicative) systemic risks ?

1. Legal situations are unusual social scenarios⁶

- Unique (highly abstract) lexicon
- Infrequent behavioral exchanges*
- No real clear parallel to other, more-common scenarios

➔ Mental representations (situation models) that are cognitively difficult to construct

1. Initial Encounter and Social-Legal Exchanges

What are the (cognitive communicative) systemic risks ?

2. Fluency disparity between lay person and legal-system agent

- more exposure to tangible representations of abstract, low-frequency concepts
- expertise facilitates communication (skewed distributed cognition)

➔ Cognitive communication burdens are unevenly distributed within the dyad

1. Initial Encounter and Social-Legal Exchanges

What are the (cognitive communicative) systemic risks ?

3. Social-communicative factors have less room for error⁷

- need for pragmatics (esp. narrative)
 - e.g., responding to a law-enforcement officer who asks "Are y'all having a good time tonight?"
- emotion recognition, non-verbal communication

➔ Additional cognitive burden AND additional imbalance within dyad

1. Initial Encounter and Social-Legal Exchanges

What are the (cognitive communicative) systemic risks ?

4. Context of Initial Encounter is often sub-optimal

- Individual may be emotional, stressed, etc.
- Individual may not WANT to be in the initial encounter
- Both will influence situation models

➔ Context can color communication and/or determine cognitive reserves

1. Initial Encounter and Social-Legal Exchanges

Systemic Risks - Summary

- ✓ Unusual social contexts
- ✓ Imbalanced communication dynamic
- ✓ Stressful, high-stakes environment

== Systemic cognitive-communicative risks

1. Initial Encounter and Social-Legal Exchanges

Implications for TBI

1. Individuals with TBIs have deficits in domain-general cognitive mechanisms

- working memory⁸
- processing speed⁹
- executive functioning¹⁰

➔ Cognitively "impoverished" (less "ordinary intelligence"?)

1. Initial Encounter and Social-Legal Exchanges

Implications for TBI

2. Individuals with TBIs have deficits in social-cognitive aspects of communication

- Pragmatics¹¹
- Emotion Recognition¹²
- Theory of Mind¹³

➔ Poorer social communication (less "ordinary prudence"?)

1. Initial Encounter and Social-Legal Exchanges

Implications for TBI

3. Individuals with TBI show impairment in producing narratives¹⁴

- microlinguistic aspects
 - word choice, sentence-level syntax
- macrolinguistic aspects
 - local and global coherence, "fluency"

➔ Less able to produce "effective" narratives

1. Initial Encounter and Social-Legal Exchanges

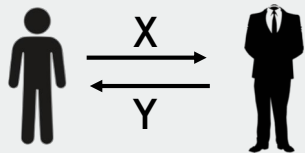
Interaction between Risks and Risk Factors

<u>Risks</u>	<u>Risk Factors</u>
Need for specialized mental representations	Cognitive "impoverishment"; poorer situation models
Imbalanced communicative dynamic	Poorer social-communication skills; impaired narratives
Stressful, high-stakes environment	Cognitive-communicative impairments; lower baseline for domain-general resources

1. Initial Encounter and Social-Legal Exchanges

One Additional Implication

Transactional behavioral elements of Initial Encounter



➔ Need to consider additional cognitive mechanisms underlying these transactional behaviors

1. Initial Encounter and Social-Legal Exchanges

Social Exchanges

Transactional behaviors in which the one party fulfills a particular requirement ("cost") to receive a particular outcome ("benefit")

Often exist as social rules, conditional formulae that describe and prescribe the transaction

E.g. If you want to receive a favor, you should request it with polite language

1. Initial Encounter and Social-Legal Exchanges

Social-Exchange Reasoning

Humans are good at reasoning through social-exchange rules¹⁵

- evolutionary pressure to detect "cheaters" or non-altruistic behavior
- certain groups with impaired social cognition (e.g., psychopathy) show selective impairment in social-exchange conditional reasoning

➔ **Dedicated "social-reasoning" cognitive abilities**

1. Initial Encounter and Social-Legal Exchanges

Experimental Questions

1. Do individuals with TBI show impaired performance on social-exchange reasoning when compared to uninjured comparisons?
2. Does the "social-exchange reasoning framework" accommodate social exchanges framed within legal contexts?

1. Initial Encounter and Social-Legal Exchanges

Design

Tested social-exchange reasoning in adults with moderate-to-severe TBI (n = 20) and without TBI (n = 21) using the Wason Task¹⁶ of legal and non-legal social exchanges

↳ Outcome measures: **accuracy** and **response time**

We hypothesized an **effect of group** (TBI < COM)

Wszalek, J.A. and Turkstra, L.S. Comprehension of social-legal exchanges in adults with and without traumatic brain injury. *Neuropsychology* (under review), NEU-2018-2158

1. Initial Encounter and Social-Legal Exchanges

Design - Wason Task

Wason Task = task of logical reasoning of conditional rules

"If P, then Q"

P = "benefit"

Q = requirement

Goal is to find "cheaters"

1. Initial Encounter and Social-Legal Exchanges

Design – Wason Task

“If P...” **“...then Q”**

If you get a birthday present... ...then send a thank-you card

If you go to vote... ...then bring identification

If you make a will... ...then sign the documents

1. Initial Encounter and Social-Legal Exchanges

Design – Wason Task

If you make a will, then sign the documents

Jack made a will	P	John signed the documents	Q
Jane did not make a will	Not P	Jill did not sign the documents	Not Q

1. Initial Encounter and Social-Legal Exchanges

Design – Wason Task

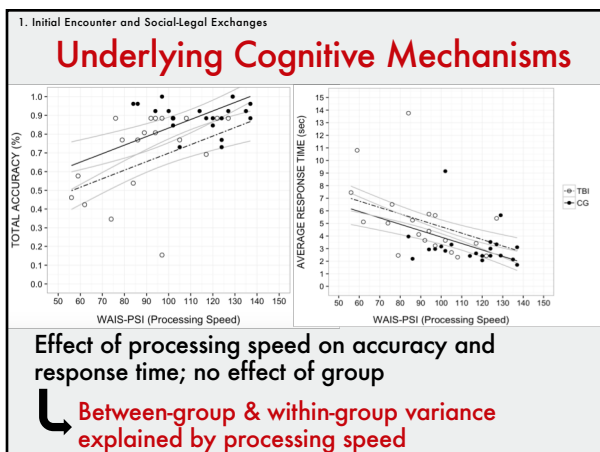
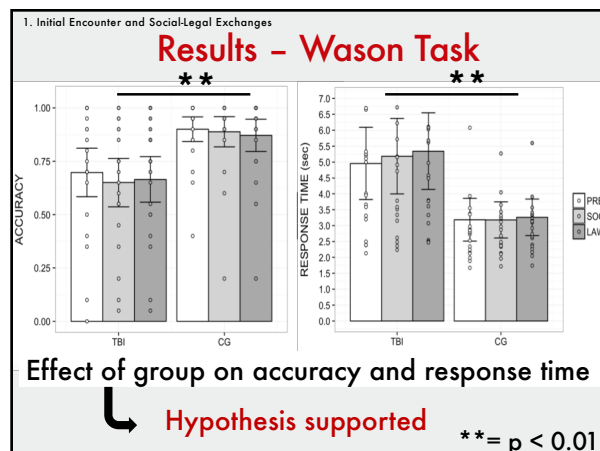
"If you make a will, then you must sign the document"

Toby didn't sign the document

Could this person have broken the rule?

NO YES

Participants choose (Y/N) to indicate whether the person on the card could have broken the rule.



1. Initial Encounter and Social-Legal Exchanges

Risks and Risk Factors - Revisited

<u>Risks</u>	<u>Risk Factors</u>
Need for specialized mental representations	Cognitive “impoverishment”; poorer situation models
Imbalanced communicative dynamic	Poorer social-communication skills; impaired narratives
Stressful, high-stakes environment	Cognitive-communicative impairments; lower baseline for domain-general resources
Need for (legal) social-exchange reasoning	Impaired conditional reasoning; processing-speed deficits

Summary of Risk and Outcomes

Initial Encounter and Social-Legal Exchanges

Hostility/Misconceptions

Unwillingness/inability to expend legal resources

Doubling down on preexisting standards

Skewed legal trajectories

What is the "legal system"?

Less access to legal resources

Resource costs

Distrust/discomfort towards legal system

Effects of social determinants of well-being

Conceptual Model: TBI and the Law

Systemic legal risks

+


Population-level (cognitive communicative) risk factors

=

Negative population-level outcomes

Scenario Two

Plea Hearings and Legal Language Comprehension



A cartoon illustration showing a judge sitting at a bench, wearing a black robe and a headband with a gavel. He is looking down at two men standing before him. The man on the left is wearing a suit and a headband with a gavel. The man on the right is wearing a suit and a headband with a gavel. The judge is asking a question, and the two men are looking at each other. The cartoon is signed 'J. DATER' in the bottom right corner.

“Does your client wish to plead ‘sweet’ or ‘lame’?”

2. Plea Hearings and Legal-Language Comprehension

What is a “plea hearing”?

Formal dialogue between judge and defendant before plea

CA: Plea Inquiry

USA: Plea Colloquy

➡ Ensure that defendant’s plea is legally valid

⤵ Defendant waives guaranteed rights

2. Plea Hearings and Legal-Language Comprehension

What is a "plea hearing"?

Pleas must be voluntary and understood

USA*

"voluntarily"

"knowingly"

"intelligently"

Knowingly/understandingly of:

1. The factual nature of the allegations
2. The legal consequences of the plea

CA**

"voluntarily"

"understandingly"

*Brady v. U.S., 397 US 742 (1970) **R.S.C., 1985, c. C-46, s. 606

2. Plea Hearings and Legal-Language Comprehension

Why plea hearings?

- Stage at which defendant gives up rights and admits legal culpability

- Overwhelmingly the norm

- USA: 95 – 97% of charges
- CA: ~ 95% of cases set for trial

A given defendant is almost certain to undergo a plea hearing & accept legal consequences

2. Plea Hearings and Legal-Language Comprehension

How plea hearings?

Courts use plea questionnaires to assess defendants' pleas

2. Plea Hearings and Legal-Language Comprehension

Rights Understandings Voluntariness

STATE OF WISCONSIN, CIRCUIT COURT, COUNTY: _____

Defendant: _____ Case No.: _____

Plea Questionnaire: Waiver of Rights

I am the defendant and intend to plea as follows:

Charge/Status	Plea	Charge/Status	Plea
1. _____	<input type="checkbox"/> Not Guilty	2. _____	<input type="checkbox"/> Not Guilty
3. _____	<input type="checkbox"/> Guilty	4. _____	<input type="checkbox"/> Guilty
5. _____	<input type="checkbox"/> Guilty	6. _____	<input type="checkbox"/> Guilty

Waiver of Rights

I understand that if I plead guilty, I will give up the following constitutional rights:

- ☐ I give up my right to remain silent and I understand that my silence could not be used against me at trial.
- ☐ I give up my right to talk to a lawyer for advice before we go to court and to have him with me at trial.
- ☐ I give up my right to plead not guilty or to prepare my defense without first seeing a lawyer.
- ☐ I give up my right to confront the people who testify against me and cross-examine them.
- ☐ I give up my right to a trial by jury.

Voluntariness

I understand that I am pleading guilty voluntarily and of my own free will. I have not been threatened or forced to enter this plea. No promises have been made to me in return for my plea. I have read this document and I understand it. I have signed it and I have made a copy for my attorney. I am asking the court to accept my plea and find me guilty.

Defendant's Signature

Date: _____

Attorney's Signature

Date: _____

2. Plea Hearings and Legal-Language Comprehension

Rights Understandings Voluntariness

Plea comprehension inquiry

Counsel has advised me that I should not plead guilty at this time and I am choosing to do so against my own free will. I understand that if I plead guilty, I will give up the following constitutional rights:

- ☐ I give up my right to remain silent and I understand that my silence could not be used against me at trial.
- ☐ I give up my right to talk to a lawyer for advice before we go to court and to have him with me at trial.
- ☐ I give up my right to plead not guilty or to prepare my defense without first seeing a lawyer.
- ☐ I give up my right to confront the people who testify against me and cross-examine them.
- ☐ I give up my right to a trial by jury.

Voluntariness

I understand that I am pleading guilty voluntarily and of my own free will. I have not been threatened or forced to enter this plea. No promises have been made to me in return for my plea. I have read this document and I understand it. I have signed it and I have made a copy for my attorney. I am asking the court to accept my plea and find me guilty.

Defendant's Signature

Date: _____

Attorney's Signature

Date: _____

2. Plea Hearings and Legal-Language Comprehension

Plea Questionnaire Content

USA: I understand that the **crime(s) to which I am pleading** has/have **elements** that the State would have to prove beyond a reasonable doubt if I had a trial.

CA: By **pleading guilty** I admit that I committed the **essential elements**--or the required parts-- of the above **criminal offence(s)** as explained by counsel.

USA: I have decided to enter this plea of my own free will. I have not been threatened or forced to enter this plea. No promises have been made to me other than those contained in the plea agreement

CA: I am pleading guilty voluntarily, of my own free will, and no one has pressured me to do so or promised me anything in return for pleading guilty

2. Plea Hearings and Legal-Language Comprehension

Plea Questionnaire Content

USA: I understand that the crime(s) to which I am pleading has/have elements that the State would have to prove beyond a reasonable doubt if I had a trial.

CA: By pleading guilty I admit that I committed the essential elements--or the required parts-- of the above criminal offence(s) as explained by counsel.

USA: I have decided to enter this plea of my own free will. I have not been threatened or forced to enter this plea. No promises have been made to me other than those contained in the plea agreement

CA: I am pleading guilty voluntarily, of my own free will, and no one has pressured me to do so or promised me anything in return for pleading guilty.

2. Plea Hearings and Legal-Language Comprehension

Implications for TBI?

- (Same) Risks and Risk Factors -

Risks

Need for specialized mental representations

Imbalanced communicative dynamic

Stressful, high-stakes environment

Need for (legal) social-exchange reasoning

Risk Factors

Cognitive "impoverishment"; poorer situation models

Poorer social-communication skills; impaired narratives

Cognitive-communicative impairments; lower baseline for domain-general resources

Impaired conditional reasoning; processing-speed deficits

2. Plea Hearings and Legal-Language Comprehension

What are the (cognitive communicative) systemic risks?

* 1 *. Legal Language is profoundly difficult¹⁷

- Even "well-known" examples of legal language are difficult to comprehend and difficult to reason with

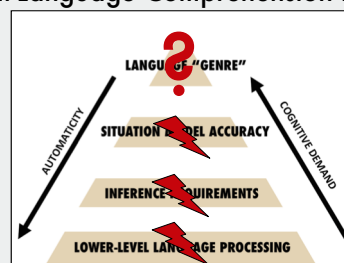
- All populations (including law-enforcement officers) show misconceptions

➡ Forces comprehension ("factual nature") and manipulation ("legal consequences") of inaccessible language

2. Plea Hearings and Legal-Language Comprehension

Implications for TBI¹⁸

Legal-Language Comprehension Model



Working memory

Processing Speed

2. Plea Hearings and Legal-Language Comprehension

Experimental Questions

1. Do individuals with TBI show impaired performance on a task of legal-language comprehension when compared to uninjured comparisons?
2. Do working memory and processing speed underlie legal-language comprehension?

2. Plea Hearings and Legal-Language Comprehension

Design

Tested language comprehension in adults with moderate-to-severe TBI (n = 19) and without TBI (n = 21) using the forced multiple-choice assessment of plea-hearing language

↳ Outcome measures: accuracy and response time

We hypothesized an effect of group (TBI < COM)

Wszalek, J.A. and Turkstra, L.S. (2018) Comprehension of legal language by adults with and without traumatic brain injury. *J Head Trauma Rehabil.* (online before print)

2. Plea Hearings and Legal-Language Comprehension

Design – Language Task

26 statements on substantive and procedural law

2. Plea Hearings and Legal-Language Comprehension

Design – Language Task

Each statement had the following four choices (modeled on CELF-5 Metalinguistics)

1. Correct meaning
2. Incorrect meaning (opposite of #1)
3. Alternative legal interpretation
4. Literal (nonsense) interpretation

Participants asked to pick option they thought best matched the statement

2. Plea Hearings and Legal-Language Comprehension

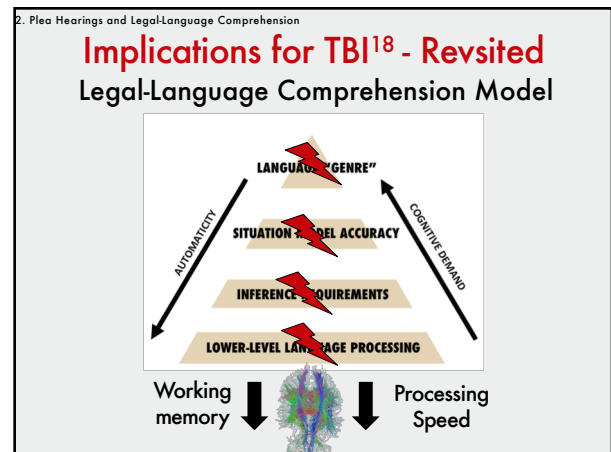
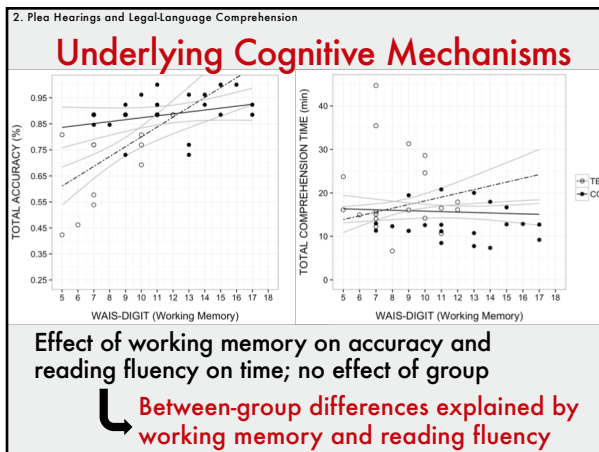
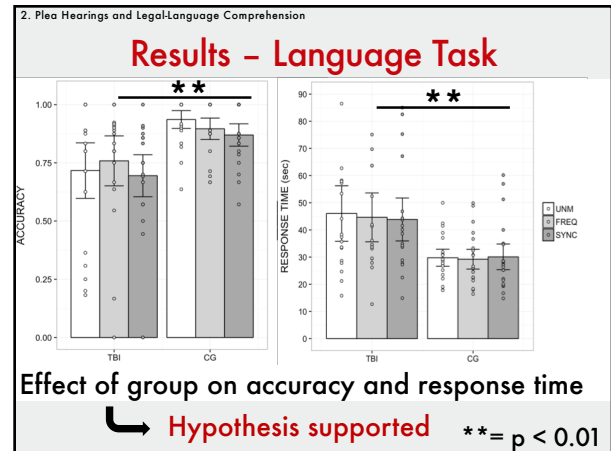
I understand that if I am convicted of a violent felony, it is unlawful for me to possess body armor.

(¥) If I am found guilty of a violent crime, I can't own body armor.
Correct

(Δ) If I am found guilty of a violent crime, I can own body armor.
Incorrect

(≈) If I am found guilty of a violent crime, I must register my body armor.
Alternative

(σ) If I am found guilty of a violent crime, I can't take over a piece of body armor.
Literal (nonsense)



2. Plea Hearings and Legal-Language Comprehension

Risks and Risk Factors – Revisited pt. II

Risks	Risk Factors
Need for specialized mental representations	Cognitive “impoverishment”; poorer situation models
Imbalanced communicative dynamic	Poorer social-communication skills; impaired narratives
Stressful, high-stakes environment	Cognitive-communicative impairments; lower baseline for domain-general resources
Need for (legal) social-exchange reasoning	Impaired conditional reasoning; processing-speed deficits
Difficult “legalese” language	Working-memory and legal language-comprehension deficits

2. Plea Hearings and Legal-Language Comprehension

Summary of Risks and Outcomes

Risks

- Need for specialized mental representations
- Imbalanced communicative dynamic
- Stressful, high-stakes environment
- Need for (legal) social-exchange reasoning
- Difficult “legalese” language

+

Risk Factors

- Cognitive “impoverishment”; poorer situation models
- Poorer social-communication skills; impaired narratives
- Cognitive-communicative impairments; lower baseline for domain-general resources
- Impaired conditional reasoning; processing-speed deficits
- Working-memory and legal language-comprehension deficits

||

Acceptance of legal (downstream) consequences without understanding language

What is the “legal system”?

of individuals

Ontario³ (2016/2017) 1,163,607

“Incidents” 106,627

Court Decisions 106,627

2. Plea Hearings and Legal-Language Comprehension

Summary of Risks and Outcomes

Failure of legal standards Increased costs = fewer overall resources Risking “repeat offenders”

Acceptance of legal (downstream) consequences without understanding language

Conceptual Model: TBI and the Law

Systemic legal risks + Population-level (cognitive communicative) risk factors || Negative population-level outcomes

Negative legal status (felon, etc.) Loss of rights (right to vote, etc.) Exposure to environments (prison, jail, etc.) that don’t promote mental well-being

2. Plea Hearings and Legal-Language Comprehension

What can you (clinicians) do?

1A) Perform cognitive communication assessments!

- CELF-5 / CASL (< 21 years)
- WJ / WAIS (> 21 years)

1B) Communicate results to legal actors!

- Patient’s lawyer
- Reference letters to court

Legal actors aren’t (necessarily) trained to look for / assess cognitive communication impairments

2. Plea Hearings and Legal-Language Comprehension

What can you (legal actors) do?

- 1) Slow down (or otherwise reduce working memory / language-comprehension demands)
- 2) Use pictures whenever possible
 - Illustrated Law resources
 - Lawcomic.net http://lawcomic.net/guide/?page_id=5
 - openlawlab <http://www.openlawlab.com/project-topics/illustrated-law-visualizations/>
- 3) If you suspect language/communication problems, get an assessment!

2. Plea Hearings and Legal-Language Comprehension

What can you (everyone) do?

- 1) Explicitly establish & define shared/common language
 - Plea Walk-Through: <https://stepstojustice.ca/steps/3-go-through-plea-inquiry>
 - Ontario Legal Aid: <https://www.legallaid.on.ca/en/>
- 2) Use the accompaniment model

2. Plea Hearings and Legal-Language Comprehension

What can you (everyone) do?

3) Ask more-appropriate questions

DON'T ask:

"Do you understand?"

DO ask:

"What do you understand?"

↳ **The only way you can see what a person's comprehension "looks" like is to have them tell you**

2. Plea Hearings and Legal-Language Comprehension

What can you (everyone) do?

4) Advocate (time, \$, voice) for systemic change

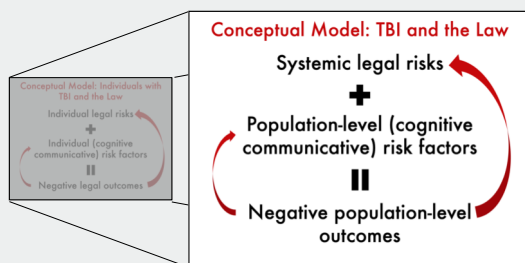
Conceptual Model: Individuals with TBI and the Law



2. Plea Hearings and Legal-Language Comprehension

What can you (everyone) do?

3) Advocate (time, \$, voice) for systemic change



2. Plea Hearings and Legal-Language Comprehension

What can you (everyone) do?

3) Advocate (time, \$, voice) for systemic change

- Education of professionals
- Prioritization of diversion & rehabilitation practices
- Reconceptualization of legal notions such as "competency"

Conclusion

- Q1 Cognitive communication-based features of the legal system that engender systemic risk ✓
- Q2 Relationships between systemic risks and individuals with TBI ✓
- Q3 Possible interventions to ameliorate systemic risks ✓

3. Conclusion

Concluding Thoughts

1. People in (criminal) justice systems face other forms of systemic risk that intersect with cognitive communication
 - Race/ethnicity
 - SES
 - Education
 - > 50% of criminal defendants do not have a high-school diploma (12-year education)

➡ **Need to address TBI in context**

3. Conclusion

Concluding Thoughts

2. There are other aspects of cognitive communication that will affect individuals with TBI

- suggestibility
- confabulation

➔ Both intersect with narrative making and working memory

➔ Both are particularly worrisome in the context of the legal system's power dynamics

3. Conclusion

Concluding Thoughts

3. My findings indicate that cognitive mechanisms (working memory, processing speed, & reading fluency) explain within- and between-group variance on behaviors highly relevant to legal systems

➔ Nothing fundamentally "different" about individuals with TBI (TBI ≠ criminality)

➔ Interventions that control for this variance should reduce between-group differences

3. Conclusion

Concluding Thoughts

4. TBI isn't the only population with communication challenges

- Individuals with SLI
- Individuals with developmental disorders
- Individuals with mental health disorders
- Individuals with poor education

➔ Interventions to support TBI will support other populations too

Acknowledgements

Legal Collaborators

- Wisconsin Criminal Jury Instructions Committee
- Prof. Dave Schultz
- Judges: Elhers, Beer, McNamara, Daley, Werner, Dyke, Slate, Nuss, Key, Seifert


Communication and Cognition Lab

Dr. Lyn Turkstra
Dr. Erica Richmond
Annie Albers
Aimee Balistreri

Acknowledgements

Funding

US DEPT OF EDUCATION
P015B100189/P015B140126
WARF MSN177080
NICHD/NCMRR RO1 HDO71089
WISCONSIN IDEA SCHOLARS ENDOWMENT



References

1. Dunning, D. L., Westgate, B. and Adlam, A. R. (2016). A meta-analysis of working memory impairments in survivors of moderate-to-severe traumatic brain injury. *Neuropsychology* 30(7), 811-819; Dymowski, A. R., Owens, J. A., Ponsford, J. L. and Willmott, C. (2015). Speed of processing and strategic control of attention after traumatic brain injury. *Journal of Clinical and Experimental Neuropsychology* 37(10), 1024-1035; Stuss, D. T. (2011). Traumatic brain injury: Relation to executive dysfunction and the frontal lobes. *Curr Opin Neurol* 24(6), 584-589.
2. Angeleri, R., Bosco, F. M., Zettin, M., Sacco, K., Colle, L. and Bara, B. G. (2008). Communication impairment in traumatic brain injury: A complete pragmatic assessment *Brain & Language* 107(229-254); Byom, L. J. and Turkstra, L. (2012). Effects of social cognitive demand on theory of mind in conversations of adults with traumatic brain injury. *Int J Lang Commun Disord* 47(3), 310-321; McDonald, S. and Flanagan, S. (2004). Social perception deficits after traumatic brain injury: Interaction between emotion recognition, mentalizing ability and social communication. *Neuropsychology* 18(3), 572-579.
3. Farrer, T. J. and Hedges, D. W. (2011). Prevalence of traumatic brain injury in incarcerated groups compared to the general population: A meta-analysis. *Prog Neuropsychopharmacol Biol Psychiatry* 35(2), 390-394; Durand, E., Watier, L., Lecu, A., Fix, M., Weiss, J. J., Chevignard, M. and Pradat-Diehl, P

References

4. Shorland, J. and Douglas, J. M. (2010). Understanding the role of communication in maintaining and forming friendships following traumatic brain injury. *Brain Injury* 24(4), 569-580; Meulenbroek, P. and Turkstra, L. S. (2016). Job stability in skilled work and communication ability after moderate-severe traumatic brain injury. *Disability and Rehabilitation* 38(5), 452-461.
5. Statistics Canada, "Adult criminal courts, number of cases and charges by type of decision," available at <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3510002701&pickMembers%5B0%5D=1.7&pickMembers%5B1%5D=2.2&pickMembers%5B2%5D=3.1&pickMembers%5B3%5D=4.1&pickMembers%5B4%5D=5.2>; "Incident-based crime statistics, by detailed violations, police services in Ontario," available at <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3510018001>.
6. Wszalek, J. A. (2017). Ethical and legal concerns associated with the comprehension of legal language and concepts. *AJOB Neuroscience* 8(1), 26-36.
7. Wszalek, J. A. and Turkstra, L. S. (2015). Language impairments in youths with traumatic brain injury: Implications for participation in criminal proceedings. *J Head Trauma Rehabil* 30(2), 86-93.
8. Dunning, D. L., Westgate, B. and Adlam, A. R. (2016). A meta-analysis of working memory impairments in survivors of moderate-to-severe traumatic brain injury. *Neuropsychology* 30(7), 811-819.

References

9. Allanson, F., Pestell, C., Gignac, G. E., Yeo, Y. X. and Weinborn, M. (2017). Neuropsychological predictors of outcome following traumatic brain injury in adults: A meta-analysis. *Neuropsychol Rev* 27(3); Hillary, F. G., Genova, H. M., Medalia, J. D., Fitzpatrick, N. M., Chiou, K. S., Wardecker, B. M., Franklin Jr., R. G., Wang, J. and DeLuca, J. (2010). The nature of processing speed deficits in traumatic brain injury: Is less brain more? *Brain Imaging Behav* 4, 141-154; Dymowski, A. R., Owens, J. A., Ponsford, J. L. and Willmott, C. (2015). Speed of processing and strategic control of attention after traumatic brain injury. *Journal of Clinical and Experimental Neuropsychology* 37(10), 1024-1035.
10. Stuss, D. T. (2011). Traumatic brain injury: Relation to executive dysfunction and the frontal lobes. *Curr Opin Neurol* 24(6), 584-589.
11. Despina, E. H., Turkstra, L. S., Struchen, M. A. and Clark, A. N. (2016). Sex-based differences in perceived pragmatic communication ability of adults with traumatic brain injury. *Archives of Physical Medicine and Rehabilitation* 97(2), S26-S32.
12. McDonald, S., Gowland, A., Randall, R., Fisher, A., Osborne-Crowley, K. and Honan, C. (2014). Cognitive factors underpinning poor expressive communication skills after traumatic brain injury: Theory of mind or executive function? *Neuropsychology* 28(5), 801-811.]
13. Turkstra, L. S., Norman, R. S., Mutlu, B. and Duff, M. C. (2018). Impaired theory of mind in adults with traumatic brain injury: A replication and extension of findings. *Neuropsychologia* 111, 117-133.

References

14. Le, K., Coelho, C., Mozeiko, J., Krueger, F. and Grafman, J. (2014). Does brain volume loss predict cognitive and narrative discourse performance following traumatic brain injury? *Am J Speech Lang Pathol* 23(2), S271-284; Marini, A., Galetto, V., Zampieri, E., Vorano, L., Zettin, M. and Carlomagno, S. (2011). Narrative language in traumatic brain injury. *Neuropsychologia* 49(10), 2904-2910.
15. Cosmides, L. (1989). The logic of social exchange: Has natural selection shaped how humans reason? Studies with the Wason selection task. *Cognition*, 31, 187-276.; Cosmides, L., & Tooby, J. (2005). Neurocognitive Adaptations Designed for Social Exchange. In D. M. Buss (Ed.), *Evolutionary Psychology Handbook* (pp. 584-687). New York: Wiley.
16. Wason, D. (1966). Reasoning. in: *New horizons in psychology*. B. M. Foss. Harmondsworth, England, Penguin: 135-151.
17. Rogers, R., Fiduccia, C. E., Drogin, E. Y., Steadham, J. A., Clark III, J. W. and Cramer, R. J. (2013). General knowledge and misknowledge of miranda rights: Are effective miranda advisements still necessary? . *Psychology, Public Policy, and Law* 19(432-452); Rogers, R., Hazelwood, L. L., Sewell, K. W., Shuman, D. W. and Blackwood, H. L. (2008). The comprehensibility and content of juvenile miranda warnings. *Psychology, Public Policy, and Law* 14(1), 63-87.
18. Wszalek, J. A. (2017). Ethical and legal concerns associated with the comprehension of legal language and concepts. *AJOB Neuroscience* 8(1), 26-36