

# Online Appendix

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This online appendix provides four additional tables referred to in the article:

Hans Peter Peters<sup>a</sup>, John T. Lang<sup>b</sup>, Magdalena Sawicka<sup>a</sup> and William K. Hallman<sup>c</sup>:  
Culture and Technological Innovation: Impact of Institutional Trust and Appreciation of Nature on Attitudes towards Food Biotechnology in the USA and Germany.  
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## Abstract

Using “general trust in institutions” and “concepts of nature” as examples, the article analyzes the influence of cultural factors on sense-making of food biotechnology and the resulting public attitudes in the USA and Germany. According to the hypotheses investigated, different levels of trust and appreciation of nature explain part of the well-known differences in attitudes between both countries. The analysis of a cross-cultural survey of the general population shows that appreciation of nature is a predictor of attitudes in both countries. The higher appreciation of nature in Germany partly explains why attitudes towards food biotechnology are more negative in Germany than in the USA. The relationship between trust and attitudes is more complex than expected, however. Institutional trust is a moderate predictor of attitudes towards food biotechnology in the USA but not in Germany. To explain the varying effectiveness of trust in resolving innovation-related uncertainty we refer to differences in issue framing in both countries and to the higher degree of universalism and individualism in the USA. We conclude that the higher relevance of trust and the lower appreciation of nature make the U.S. culture more apt to assimilate technical innovations than the German culture.

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**Table A-1:** Items used to construct the scale “trust in institutions”.

		USA [%]	Germany [%]	t-Test <sup>a</sup>	
T1a	Political institutions – such as the US Congress and government agencies – try to do what is best for society <i>Politische Institutionen – wie z.B. der Deutsche Bundestag, Bundesministerien und Bundesbehörden – versuchen das zu tun, was am besten für die Gesellschaft ist</i>	Strongly agree Somewhat agree Somewhat disagree Strongly disagree <sup>b</sup> <i>Don't know / no answer</i>	10.9 40.4 24.4 20.8 3.4	5.0 22.8 45.6 25.3 1.3	p ≤ 0.01
T2a	Legal institutions – such as the Supreme Court and other courts – try to do what is best for society <i>Juristische Institutionen – wie z.B. das Bundesverfassungsgericht und andere Gerichte – versuchen das zu tun, was am besten für die Gesellschaft ist</i>	Strongly agree Somewhat agree Somewhat disagree Strongly disagree <i>Don't know / no answer</i>	18.6 47.5 16.9 13.1 3.9	23.3 43.6 23.6 8.5 1.1	n.s.
T3a	Economic institutions – such as large corporations and banks – try to do what is best for society <i>Wirtschafts-Institutionen – wie z.B. große Unternehmen und Banken – versuchen das zu tun, was am besten für die Gesellschaft ist</i>	Strongly agree Somewhat agree Somewhat disagree Strongly disagree <i>Don't know / no answer</i>	7.7 26.5 32.4 29.0 4.3	7.7 10.9 48.8 32.0 0.7	p ≤ 0.01
T4a	Scientific institutions – such as universities and government research laboratories – try to do what is best for society <i>Wissenschaftliche Institutionen – wie z.B. Universitäten und staatliche Forschungszentren – versuchen das zu tun, was am besten für die Gesellschaft ist</i>	Strongly agree Somewhat agree Somewhat disagree Strongly disagree <i>Don't know / no answer</i>	22.8 51.6 15.9 5.7 4.1	18.5 50.2 25.7 3.9 1.7	p ≤ 0.01
T1b	Political institutions – such as the US Congress and government agencies – are NOT competent enough to make the right decisions <i>Politische Institutionen – wie z.B. der Deutsche Bundestag, Bundesministerien und Bundesbehörden – sind NICHT kompetent genug, um die richtigen Entscheidungen zu treffen</i>	Strongly agree Somewhat agree Somewhat disagree Strongly disagree <i>Don't know / no answer</i>	18.0 32.6 32.1 12.7 4.6	22.5 29.6 35.4 7.6 4.8	p ≤ 0.05
T2b	Legal institutions – such as the Supreme Court and other courts – are NOT competent enough to make the right decisions <i>Juristische Institutionen – wie z.B. das Bundesverfassungsgericht und andere Gerichte – sind NICHT kompetent genug, um die richtigen Entscheidungen zu treffen</i>	Strongly agree Somewhat agree Somewhat disagree Strongly disagree <i>Don't know / no answer</i>	14.2 26.8 37.6 15.9 5.5	13.5 27.6 40.2 12.6 6.1	n.s.
T3b	Economic institutions – such as large corporations and banks – are NOT competent enough to make the right decisions <i>Wirtschafts-Institutionen – wie z.B. große Unternehmen und Banken – sind NICHT kompetent genug, um die richtigen Entscheidungen zu treffen</i>	Strongly agree Somewhat agree Somewhat disagree Strongly disagree <i>Don't know / no answer</i>	19.7 31.2 31.9 11.2 6.0	14.2 32.3 41.5 7.6 4.5	n.s.
T4b	Scientific institutions – such as universities and government research laboratories – are NOT competent enough to make the right decisions <i>Wissenschaftliche Institutionen – wie z.B. Universitäten und staatliche Forschungszentren – sind NICHT kompetent genug, um die richtigen Entscheidungen zu treffen</i>	Strongly agree Somewhat agree Somewhat disagree Strongly disagree <i>Don't know / no answer</i>	12.6 24.8 41.0 17.5 4.1	8.4 30.9 44.4 9.4 6.8	n.s.
		100.0 (n=601)	100.0 (n=942)		

<sup>a</sup> Statistical significance of mean differences between USA and Germany (omitting “Don't know / no answer” responses from the analysis).

<sup>b</sup> German version of answer scale: stimme voll und ganz zu, stimme eher zu, stimme eher nicht zu, stimme überhaupt nicht zu.

**Table A-2:** Items used to construct the scale “appreciation of nature”.

			USA [%]	Germany [%]	t-Test <sup>a</sup>
N1	It is okay for humans to change nature to their advantage <i>Es ist in Ordnung, wenn Menschen die Natur zu ihrem Vorteil verändern</i>	Strongly agree Somewhat agree Somewhat disagree Strongly disagree <sup>b</sup> <i>Don't know / no answer</i>	7.7 26.3 27.6 34.6 3.8	8.5 21.0 46.4 23.8 0.4	n.s.
N2	Nature should be left alone <i>Die Natur sollte in Ruhe gelassen werden</i>	Strongly agree Somewhat agree Somewhat disagree Strongly disagree <i>Don't know / no answer</i>	41.1 31.2 18.8 7.0 1.8	49.5 35.4 13.5 1.5 0.1	$p \leq 0.01$
N3	Human activities can easily destroy the balance of nature <i>Menschliches Handeln kann leicht das Gleichgewicht der Natur zerstören</i>	Strongly agree Somewhat agree Somewhat disagree Strongly disagree <i>Don't know / no answer</i>	66.4 22.3 6.0 3.6 1.7	76.6 16.7 5.1 1.5 0.1	$p \leq 0.01$
N4	Nature usually finds ways to adapt to environmental changes caused by humans <i>Die Natur findet meist Wege, um sich an Umweltveränderungen anzupassen, die der Mensch verursacht hat</i>	Strongly agree Somewhat agree Somewhat disagree Strongly disagree <i>Don't know / no answer</i>	27.6 39.4 17.2 11.1 4.7	32.1 32.8 28.7 5.2 1.2	n.s.
N5	Humans are smarter than nature <i>Menschen sind klüger als die Natur</i>	Strongly agree Somewhat agree Somewhat disagree Strongly disagree <i>Don't know / no answer</i>	13.1 20.5 30.7 30.0 5.6	6.4 10.5 45.1 35.2 2.8	$p \leq 0.01$
N6	Things found in nature are more perfect than things made by humans <i>Dinge aus der Natur sind perfekter als Dinge, die der Mensch hergestellt hat</i>	Strongly agree Somewhat agree Somewhat disagree Strongly disagree <i>Don't know / no answer</i>	43.6 33.0 14.7 2.8 5.9	50.7 32.5 10.9 3.1 2.8	$p \leq 0.05$
N7	Humans must control nature to protect themselves <i>Menschen müssen die Natur kontrollieren, um sich selbst zu schützen</i>	Strongly agree Somewhat agree Somewhat disagree Strongly disagree <i>Don't know / no answer</i>	21.8 31.4 21.6 21.6 3.6	30.4 24.4 28.0 15.7 1.5	$p \leq 0.01$
N8	Nature must be protected against humans <i>Die Natur muss vor den Menschen geschützt werden</i>	Strongly agree Somewhat agree Somewhat disagree Strongly disagree <i>Don't know / no answer</i>	48.8 36.9 6.4 2.8 5.0	62.9 27.8 6.3 2.1 0.9	$p \leq 0.01$
			100.0 (n=601)	100.0 (n=942)	

<sup>a</sup> Statistical significance of mean differences between USA and Germany (omitting “Don’t know / no answer” responses from the analysis).

<sup>b</sup> German version of answer scale: stimme voll und ganz zu, stimme eher zu, stimme eher nicht zu, stimme überhaupt nicht zu.

**Table A-3:** Items used to construct the scale “attitude towards GM food”.

			USA [%]	Germany [%]	t-Test <sup>a</sup>
A1	Genetically modified food presents no danger for future generations <i>Genetisch veränderte Lebensmittel stellen keine Gefahr für zukünftige Generationen dar</i>	Strongly agree Somewhat agree Somewhat disagree Strongly disagree <sup>b</sup> <i>Don't know / no answer</i>	7.7 14.3 28.2 27.2 22.6	5.3 12.6 31.4 38.2 12.4	$p \leq 0.01$
A2	I think it is safe for me to eat genetically modified food <i>Ich glaube, dass ich gefahrlos genetisch veränderte Lebensmittel essen kann</i>	Strongly agree Somewhat agree Somewhat disagree Strongly disagree <i>Don't know / no answer</i>	13.8 31.3 16.5 23.5 14.9	8.1 13.9 38.1 34.7 5.3	$p \leq 0.01$
A3	I would buy genetically modified food if it were cheaper than ordinary food <i>Ich würde genetisch veränderte Lebensmittel kaufen, wenn diese preiswerter als gewöhnliche Lebensmittel wären</i>	Strongly agree Somewhat agree Somewhat disagree Strongly disagree <i>Don't know / no answer</i>	13.2 21.0 24.0 33.6 8.2	7.5 7.1 27.8 56.2 1.4	$p \leq 0.01$
A4	Consumers should have the right to buy genetically modified food if they want to <i>Konsumenten sollten das Recht haben, genetisch veränderte Lebensmittel zu kaufen, wenn sie es möchten</i>	Strongly agree Somewhat agree Somewhat disagree Strongly disagree <i>Don't know / no answer</i>	50.4 38.4 5.0 3.4 2.9	56.8 22.0 11.6 7.3 2.3	n.s.
A5	Genetically modified food threatens the natural order of things <i>Genetisch veränderte Lebensmittel bedrohen die natürliche Ordnung der Dinge</i>	Strongly agree Somewhat agree Somewhat disagree Strongly disagree <i>Don't know / no answer</i>	28.1 27.4 22.9 9.0 12.7	50.7 22.1 16.5 6.3 4.3	$p \leq 0.01$
A6	Serious accidents involving genetically modified foods are bound to happen <i>Im Zusammenhang mit genetisch veränderten Lebensmitteln wird es zwangsläufig zu schwerwiegenden Unglücksfällen kommen</i>	Strongly agree Somewhat agree Somewhat disagree Strongly disagree <i>Don't know / no answer</i>	31.6 36.0 17.1 4.5 10.7	18.9 26.6 29.6 11.8 13.0	$p \leq 0.01$
A7	I would pay more for food that was NOT genetically modified <i>Ich würde mehr für Lebensmittel bezahlen, die NICHT genetisch verändert sind</i>	Strongly agree Somewhat agree Somewhat disagree Strongly disagree <i>Don't know / no answer</i>	32.3 23.0 22.1 13.5 9.1	52.1 22.5 12.4 10.7 2.3	$p \leq 0.01$
A8	I would be upset if I were served genetically modified food in a restaurant without knowing it <i>Ich wäre ziemlich beunruhigt, wenn mir in einem Restaurant ohne mein Wissen genetisch veränderte Lebensmittel serviert würden</i>	Strongly agree Somewhat agree Somewhat disagree Strongly disagree <i>Don't know / no answer</i>	53.0 14.6 16.3 11.9 4.3	60.7 13.9 15.0 8.4 1.9	$p \leq 0.01$
			100.0 (n=601)	100.0 (n=942)	

<sup>a</sup> Statistical significance of mean differences between USA and Germany (omitting “Don’t know / no answer” responses from the analysis).

<sup>b</sup> German version of answer scale: stimme voll und ganz zu, stimme eher zu, stimme eher nicht zu, stimme überhaupt nicht zu.

**Table A-4:** Control variables (after weighing).

		USA [%]	Germany [%]
Sex	Male	48.0	47.7
	Female	52.0	52.3
Age group	18-29 years	21.2	15.2
	30-44 years	30.7	28.5
	45-59 years	23.9	24.4
	60 years and older	21.6	32.0
	<i>No answer</i>	2.5	0.0
Level of education	Low <sup>a</sup>	47.2	53.5
	Medium	26.6	26.5
	High	24.9	19.6
	<i>No answer</i>	1.3	0.5
Awareness („How much would you say you’ve heard or read about genetically modified foods?“)	Nothing at all	14.1	6.6
	Not much	25.0	21.6
	Some	45.7	42.1
	A great deal	15.2	29.7
		100.0 (n=601)	100.0 (n=942)

<sup>a</sup> For an explanation of how this variable was coded see the methods section.