

Neural precursors of decisions that matter—an ERP study of deliberate and arbitrary choice

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Supplementary material

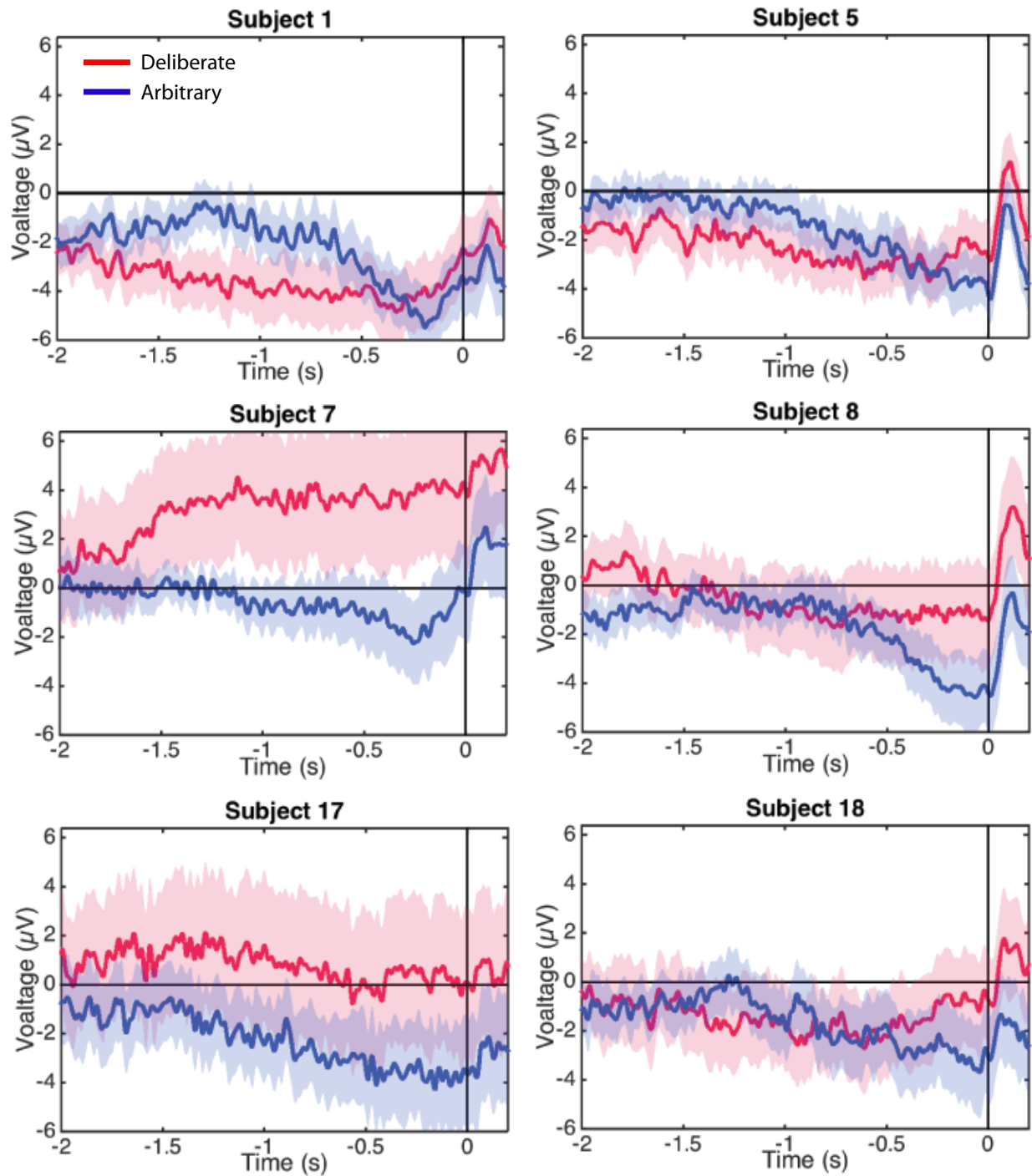


Figure S1: Individual-subjects RPs. Six examples of for individual subjects' RPs (ERPs in the Cz electrode aligned to movement onset) for deliberate decisions (in red) and arbitrary ones (in blue).

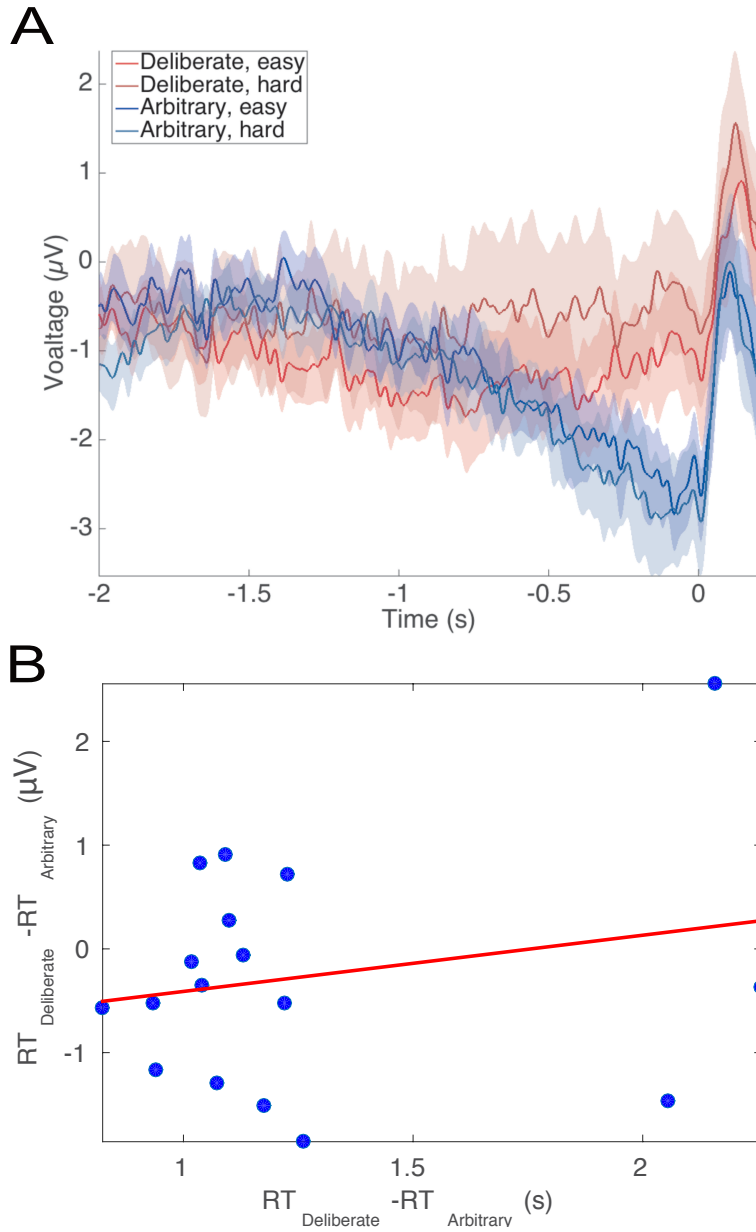


Figure S2: Relations between RTs and RPs. (A) The subjects with above-median RTs for arbitrary decisions (in blue) and below-median RTs for deliberate decisions (in red), show the same pattern that was found in the main analysis (compare Fig. 3 in main text). (B) A regression of the difference between the RPs versus the difference between the RTs for deliberate and arbitrary decisions for each subject. The equation of the regression line is $y = 0.54 [CI -0.8, 1.89] x - 0.95 [CI -2.75, 0.85]$. The R^2 is 0.05. One subject, #7, had an RT difference between deliberate and arbitrary decisions that was more than 6 interquartile ranges (IQRs) away from the median difference across all subjects. That same subject's RT difference was also more than 5 IQRs higher than the 75th percentile across all subjects. That subject was therefore designated an outlier and removed from the regression analysis.

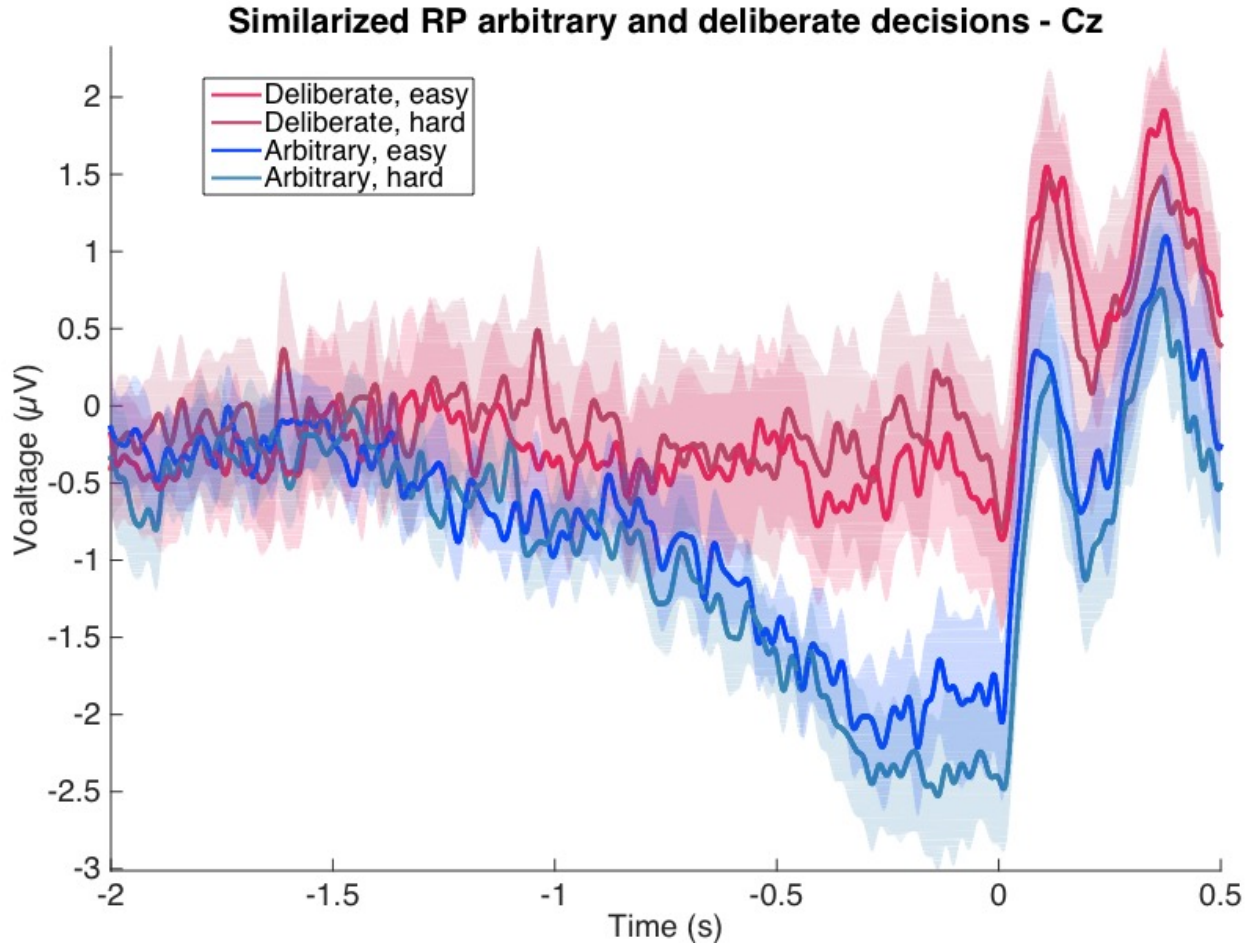


Figure S3: Relations between eye movements and RPs. (A) Trials with below-median number of saccades for arbitrary decisions (in blue) and above-median number of saccades for deliberate decisions (in red), show the same pattern that was found in the main analysis (compare Fig. 3 in main text).

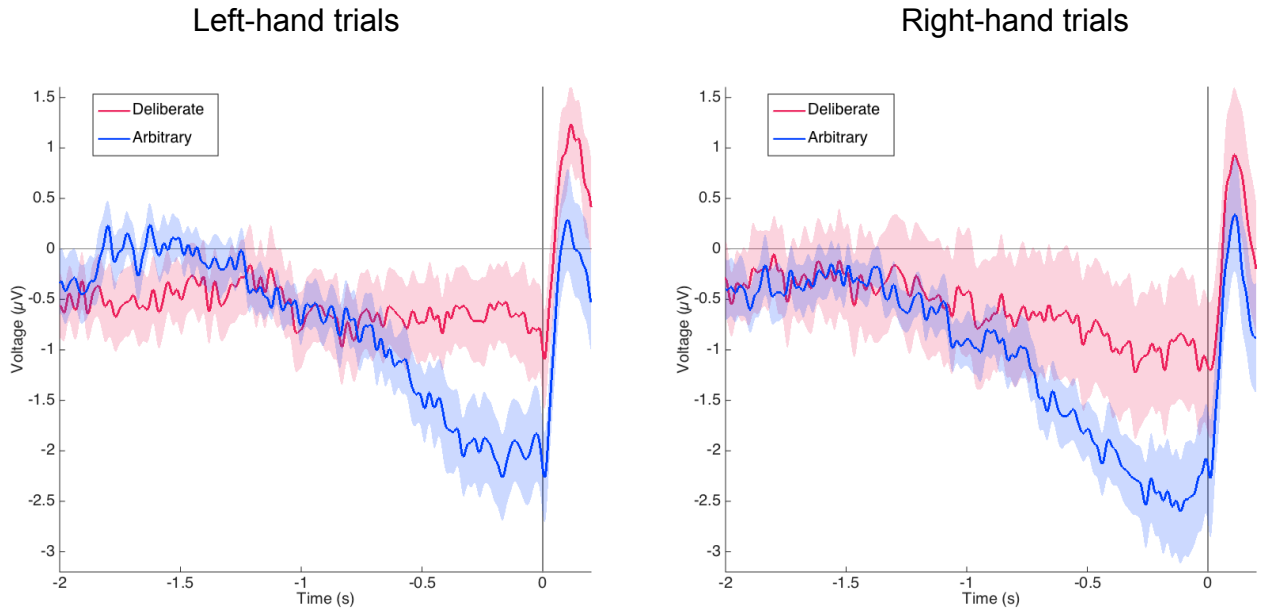


Figure S4: RPs for left-hand and right-hand trials. The RP for trials where subjects moved their left hand (left panel) and their right hand (right panel) separately. Dividing the trials into left-hand and right-hand ones results in only half the number of trials per subject, compared with Fig. 3. So, easy and hard decisions were pooled together to get back to approximately the same number of trials. Notably, the main pattern of results persists for each type of trials (right/left responses), where an RP is found for arbitrary decisions only.

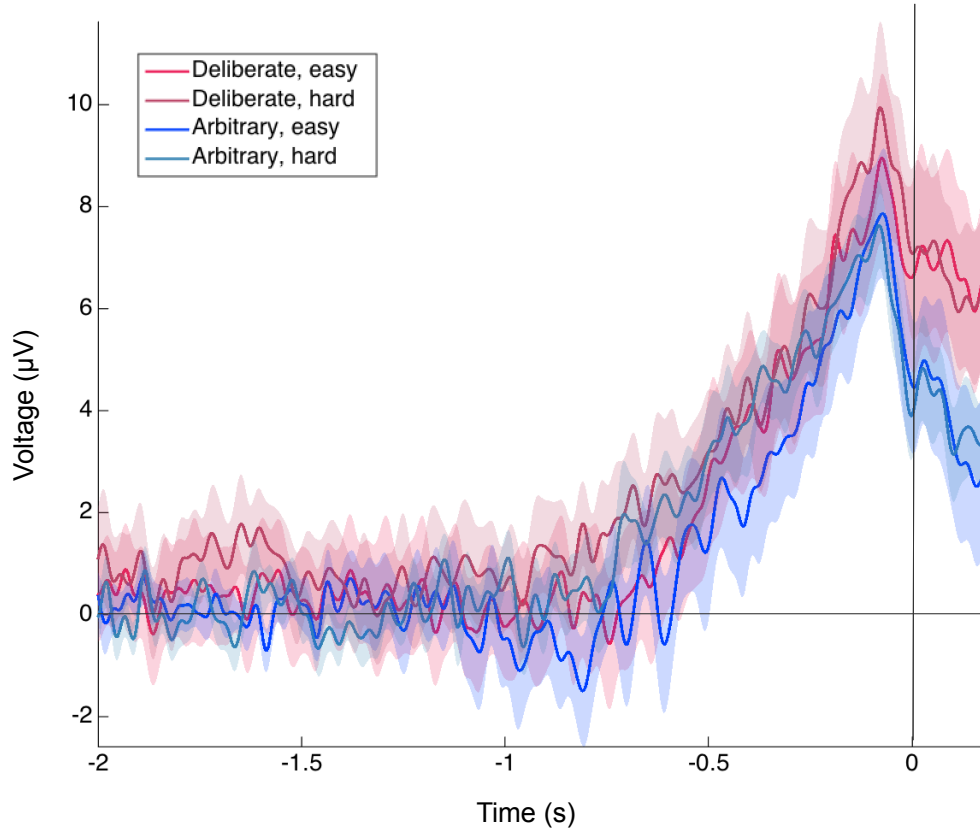


Figure S5: Lateralized readiness potential. The lateralized readiness potential (LRP) for deliberate and arbitrary, easy and hard decisions. No difference was found between the conditions (ANOVA all $F_s < 1$).

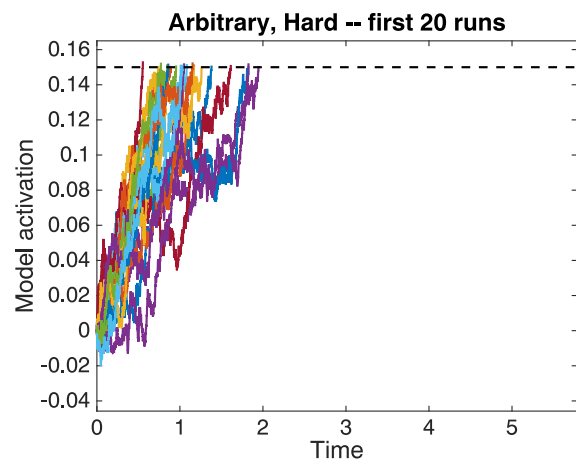
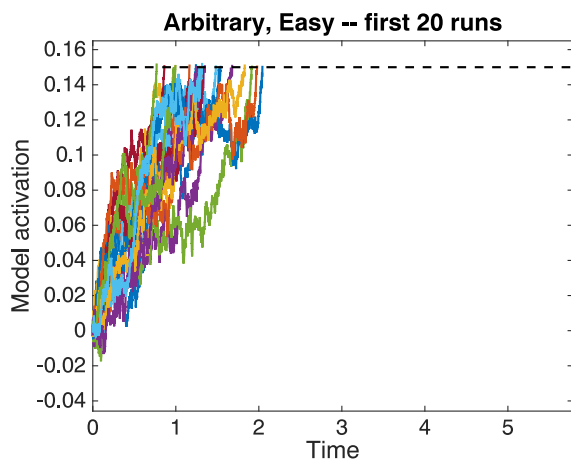
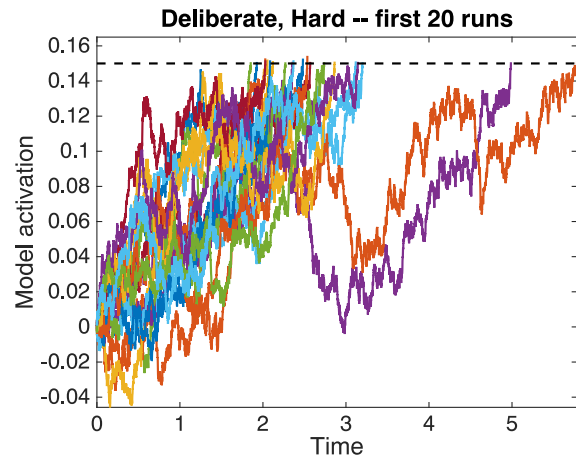
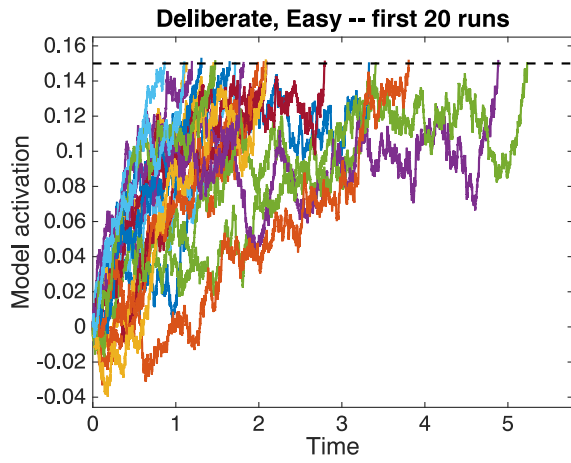


Figure S6: Model runs. The first 20 model runs for all four decision conditions. The integration threshold, at 0.15, is designated by a dashed line in all decision conditions. Here $t = 0$ s designates the beginning of the model's run.

Table S1: NPO names and causes acronyms

NPO	Cause	NPO website
Consensual NPOs		
American Society on Aging	Pro Quality of Life for the Elderly	http://asaging.org/
Conservation Fund	Pro Environment protection'	http://www.conservationfund.org/
Bill & Melinda Gates Foundation	Pro Education	http://www.gatesfoundation.org/
Global Fund for Women	Pro Women's Rights	https://www.globalfundforwomen.org/
The Hunger Project	Pro Hunger Relief	https://www.thp.org/
Oxfam International	Pro Poverty & Disaster Relief	http://www.oxfam.org/
World Wild Life Fund (WWF)	Pro Species Conservation	http://worldwildlife.org/
Cancer Research Institute	Pro Cancer Research	http://www.cancerresearch.org/
Habitat for Humanity	Pro Housing for All	http://www.habitat.org/
Reading is Fundamental	Pro Advancement of Literacy	http://www.rif.org/
International Institute for Conservation of Historic and Artistic Works	Pro Culture & Arts Preservation	https://www.iiconservation.org/
Big Brothers and Big Sisters of America	Pro Youth Development	http://www.bbbs.org/site/c.9iILI3NGK6F/b.5962335/k.BE16/Home.htm
United Nations Children's Fund (UNICEF)	Pro Child Protection	http://www.unicef.org/
Doctors without Borders (Medecins sans frontieres)	Pro Disaster Medical Care	http://www.msf.org/
Soldiers' Angels	Pro Veterans & Military	http://www.soldiersangels.org/heroes/index.php
Disability Rights International	Pro Disabilities Rights	http://www.disabilityrightsintl.org/

National Crime Prevention Council (NCPC)	Pro Crime Prevention	http://www.ncpc.org/
Amnesty International	Pro Human Rights	https://www.amnesty.org/
Peace Corps	Pro Peace & Development	http://www.peacecorps.gov/
World Health Organization	Pro World Health	http://www.who.int/en/
Controversial NPOs		
Planned Parenthood	Pro Abortion & Family Planning	http://www.plannedparenthood.org/
Pro-Life Alliance	Anti Abortion & Family Planning	http://www.prolifealliance.com/
Human Rights Campaign	Pro LBGTQ Rights	http://www.hrc.org/
National Organization for Marriage	Anti LBGTQ Rights	https://www.nationformarriage.org/
Stem for Life Foundation	Pro Stem Cell Research	http://www.stemforlife.org/
Christian Dental & Medical Association	Anti Stem Cell Research	http://www.cmda.org/
Greenpeace	Pro Action Against Climate Change	http://www.greenpeace.org/international/en/
Global Climate Scam	Anti Action Against Climate Change	http://www.globalclimatescam.com/
National Association for Gun Rights	Pro Gun Rights	http://www.nationalgunrights.org/
Coalition to Stop Gun Violence	Pro Gun Control	http://csgv.org/
American Gas Association	Pro Fracking for Natural Gas	http://www.aga.org/Pages/default.aspx
Americans Against Fracking	Anti Fracking for Natural Gas	http://www.americansagainstfracking.org/
StandWithUs (Israel)	Pro Israel	http://www.standwithus.com/
Palestinian Centre for Human Rights	Pro Palestine	http://www.pchrgaza.org/portal/en/
National Organization for	Pro Marijuana Legalization	http://norml.org/

the Reform of Marijuana Laws		
Citizens Against Legalizing Marijuana	Anti Marijuana Legalization	http://www.calmca.org/
Understanding Animal Research	Pro Scientific Experiments on Animals	http://www.understandinganimalresearch.org.uk/
International Association Against Painful Experiments on Animals	Anti Scientific Experiments on Animals	http://www.iaapea.com/
Federation for American Immigration Reform	Pro Immigration Reform	http://www.fairus.org/
American Immigration Control	Anti Immigration Reform	http://www.immigrationcontrol.com/
Human Cloning Foundation	Pro Human Cloning	http://www.humancloning.org/
Americans to Ban Cloning	Anti Human Cloning	http://www.cloninginformation.org/
Americans United for Separation of Church and State	Pro Separation of Church & State	https://www.au.org/
Christian Coalition of America	Anti Separation of Church & State	http://www.cc.org
Death with Dignity National Center	Pro Euthanasia (Assisted Suicide)	http://www.deathwithdignity.org/
Euthanasia Prevention Coalition	Anti Euthanasia (Assisted Suicide)	http://www.epcc.ca/
The Alliance for Better Foods	Pro Genetically Modified Foods	http://www.betterfoods.org/
Non-GMO Project	Anti Genetically Modified Foods	http://www.nongmoproject.org/
Answers in Genesis	Pro Creationism Teaching	https://answersingenesis.org
National Center for Science Education	Pro Evolution Teaching	http://ncse.com/