SUPPORTING INFORMATION

Palladium(II)-Catalyzed Enantioselective Synthesis of α -(Trifluoromethyl)arylmethylamines

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Table of contents

Experimental Methods	S1
Materials	S1
Instrumentation	S2
Detailed Experimental Procedures	S2
Synthesis of the starting material	
Synthesis of α -(trifluoromethyl)arylmethylamines	
Characterization Data	S3
References	S11
Copies of ^1H and ^{13}C NMR spectra	S12

Experimental methods. All reactions were performed without taking any precautions to exclude ambient air or moisture. Analytical thin layer chromatography (TLC) was performed with EMD MilliporeTM normal phase silica plates (60 Å pore diameter, F254 indicator). Visualization was accomplished under UV light (254 nm) followed by immersion in a *p*-anisaldehyde or KMnO_4 solution and heating with a heat gun. Purification of reaction products was done by flash chromatography with Silicycle SiliaFlashTM F60 Ultra-Pure 230-400 mesh silica gel.

Materials. Palladium catalysts were purchased from Strem Chemicals Inc. Trifluoroacetaldehyde methyl hemiacetal (90%, technical grade) was purchased from Alfa Aesar. The boroxines were prepared by heating the corresponding boronic acid at 125 °C (oil bath) under high-vacuum (approx. 0.5 mbar) for 12-16h. Chiral ligands L_1 - L_8 were synthesized according to a published procedure.^{1a-c} 1,2-dichloroethane (DCE) was distilled over calcium hydride before use; methanol (ACS reagent) was used as received.

Instrumentation. Proton nuclear magnetic resonance spectra (^1H NMR), fluorine spectra (^{19}F NMR) and carbon spectra (^{13}C NMR) were recorded at 400 MHz (^1H), 377 MHz (^{19}F) or 100 MHz (^{13}C). Shifts for proton spectra are reported in parts per million (δ scale) and are referenced to tetramethylsilane ($\delta = 0$ ppm). Chemical shifts for fluorine spectra are reported in parts per million (δ scale) and referenced to external CFCl_3 . Chemical shifts for carbon resonances are reported in parts per million (δ scale) and are referenced to the carbon resonance of the solvent (CDCl_3 , $\delta = 77.0$ ppm). Data is represented as follows: chemical shift, multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet, br = broad), coupling constant (J , Hz) and integration. High resolution mass spectra were obtained in positive ESI mode. Melting points were taken on a Fisher-Johns melting point apparatus. Optical rotations were measured in a 10.0 cm cell with a Rudolph Autopol IV digital polarimeter equipped with a sodium lamp source (589 nm), and are reported as follows: $[\alpha]_{\text{D}}^T$ c (c = g/100 mL, solvent). Enantiomeric excesses (ee) were determined by normal phase HPLC analysis on an AD-H chiral column using a mixture of isopropanol: hexanes. Elution conditions for specific compounds are reported below.

Detailed Experimental Procedures

A. Synthesis of the starting material

General procedure A. *N,O*-acetals were synthesized according to a modified literature procedure.² In a 100 mL round-bottom flask, trifluoroacetaldehyde methyl hemiacetal (30 mmol, 3 eq.), the primary aniline (10 mmol, 1 eq.) and *p*-toluenesulfonic acid monohydrate (1 mmol, 0.1 eq.) were dissolved in 25 mL methanol. A reflux condenser was attached and the reaction mixture was stirred at 70-75 °C for 2h. After cooling to room temperature, the contents of the flask were diluted with 70 mL ethyl acetate and poured in 70 mL half-saturated aqueous NaHCO₃. The aqueous layer was separated and extracted twice with 70 mL EtOAc. The combined organic layers were washed with brine, dried over sodium sulfate and concentrated to an oil under reduced pressure. The crude oil was loaded on a silica gel column and eluted with a mixture of hexanes and ethyl acetate.

B. Synthesis of α -(trifluoromethyl)arylmethylamines

General procedure B. In an oven-dried 2-dram vial, palladium acetate (0.020 mmol, 10 mol %) and the chiral ligand (0.024 mmol, 12 mol %) were dissolved in 500 μ L DCE. The vial was capped and the yellow solution was stirred 15 min at room temperature. The *N,O*-acetal (0.20 mmol, 1 eq.), dissolved in 300 μ L DCE, was added via syringe to the catalyst solution, followed by 3x 100 μ L DCE rinses. The boroxine (0.20 mmol, 1 eq.) was then added as a solid. The vial was recapped and immersed in an oil bath preheated at 60 °C. After the indicated amount of time, the reaction was cooled to room temperature and filtered through a short plug of silica packed in a Pasteur pipette, flushing with approximately 10 mL EtOAc. The solvent was evaporated, the crude mixture dissolved in a small amount of toluene and then loaded on a silica gel column, eluting with a mixture of hexanes and ethyl acetate.

Synthesis of racemic α -(trifluoromethyl)arylmethylamines. Procedure B was followed with the exception that 2,2'-bipyridine (bipy) was used as the achiral ligand.

C. Removal of the amine PMP group

A modified literature procedure was followed (Ref. 11 in article). Amine **2b** (0.30 mmol, 68.2 mg) was dissolved in 2.7 mL MeCN and 2.7 mL water. Periodic acid (0.60 mmol, 136.8 mg) was added, followed by 2 drops of concentrated sulfuric acid (approx. 30 mg, 0.3 mmol, 1 equiv). The reaction was stirred at room temperature for 20h. 10 mL dichloromethane was added and the mixture was poured in a separatory funnel. The top aqueous layer was further acidified with a few drops of 50% aq. H₂SO₄ to pH=2. The layers were separated and the organic layer was discarded. The aqueous layer was basified with addition of 20% aq. KOH until pH=10. It was then extracted four times with 15 mL diethyl ether. The ether extracts were dried over MgSO₄, filtered and concentrated to near dryness. A solution of HCl in diethyl ether (ca. 1M) was added dropwise until complete precipitation of the amine salt. The white suspension was concentrated to dryness to yield pure **3**.

Characterization data

1) Starting material. Synthesized according to General Procedure A.

N-(2,2,2-trifluoro-1-phenylethyl)aniline (1a).² Eluent: hexanes / EtOAc 95:5. Yield= 78% (clear oil). ¹H NMR (CDCl₃): 7.22-7.27 (m, 2H), 6.86-6.91 (m, 1H), 6.76-6.79 (m, 2H), 4.97-5.04 (m, 1H), 4.20-4.26 (br, 1H), 3.48 (s, 1H). ¹³C NMR (CDCl₃): 144.0, 129.6, 122.9 (q, *J*(C-F) = 284 Hz), 120.4, 114.5, 83.5 (q, *J*(C-F) = 34 Hz), 56.0. ¹⁹F NMR (CDCl₃): -80.08 (d, *J* = 4.9 Hz).

4-methoxy-N-(2,2,2-trifluoro-1-methoxyethyl)aniline (1b).² Eluent: hexanes / EtOAc 90:10. Yield= 82% (yellow oil). ¹H NMR (CDCl₃, 400 MHz): 6.80-6.84 (m, 2H), 6.73-6.77 (m, 2H), 4.84-4.90 (m, 1H), 3.98-4.06 (br, 1H), 3.76 (s, 1H), 3.46 (s, 1H). ¹³C NMR (CDCl₃, 100 MHz): 154.1, 138.1, 122.9 (q, *J*(C-F) = 283 Hz), 116.7, 114.9, 85.0 (q, *J*(C-F) = 33 Hz), 56.1, 55.6. ¹⁹F NMR (CDCl₃): -79.98 (d, *J* = 4.6 Hz). A small doublet is visible at -70.62 ppm. The latter belongs to the corresponding imine.³

4-chloro-N-(2,2,2-trifluoro-1-methoxyethyl)aniline (1c).² Eluent: hexanes / EtOAc 95:5. Yield= 80% (clear oil). ¹H NMR (CDCl₃, 400 MHz): 7.18-7.22 (m, 2H), 6.69-6.73 (m, 2H), 4.91-4.97 (m, 1H), 4.23-4.28 (br, 1H), 3.47 (s, 3H). ¹³C NMR (CDCl₃, 100 MHz): ¹⁹F NMR (CDCl₃): -80.00 ppm (d, *J* = 4.6 Hz)

Ethyl 4-((2,2,2-trifluoro-1-methoxyethyl)amino)benzoate (1d).² Eluent: hexanes / EtOAc 85:15. Yield= 68% (white solid, mp=89-91 °C). ¹H NMR (CDCl₃, 400 MHz): 7.91-7.95 (m, 2H), 6.73-6.77 (m, 2H), 5.03-5.09 (m, 1H), 4.53-4.58 (br, 1H), 4.32 (q, *J* = 7.1 Hz, 2H), 3.48 (s, 3H), 1.36 (t, *J* = 7.1 Hz, 3H). ¹³C NMR (CDCl₃, 100 MHz): 166.2, 148.3, 131.6, 122.6 (q, *J*(C-F) = 286 Hz), 122.3, 113.3, 82.6 (q, *J*(C-F) = 33 Hz), 60.6, 56.2, 14.4. ¹⁹F NMR (CDCl₃): -80.07 (d, *J* = 4.2 Hz)

2-methoxy-N-(2,2,2-trifluoro-1-methoxyethyl)aniline (1e).² Eluent: hexanes / EtOAc 90:10. Yield= 67% (clear oil). ¹H NMR (CDCl₃, 400 MHz): 6.75-6.91 (m, 4H), 5.00-5.06 (m, 1H), 4.88-4.94 (br, 1H), 3.87 (s, 3H), 3.45 (s, 3H). ¹³C NMR (CDCl₃, 100 MHz): 147.2, 134.3, 123.0 (q, *J*(C-F) = 285 Hz), 121.1, 119.7, 111.9, 110.4, 83.17 (q, *J*(C-F) = 33 Hz), 55.6. ¹⁹F NMR (CDCl₃): -79.93 (d, *J* = 4.3 Hz).

3-bromo-N-(2,2,2-trifluoro-1-methoxyethyl)aniline (1f). Eluent: hexanes / EtOAc 95:5. Yield= 74% (white solid, mp=39-40 °C). ¹H NMR (CDCl₃, 400 MHz): 7.08-7.12 (m, 1H), 7.00-7.02 (m, 1H), 6.93-6.95 (m, 1H), 6.68-6.71 (m, 1H), 4.93-4.99 (m, 1H), 4.26-4.31 (br, 1H), 3.49 (s, 3H). ¹³C NMR (CDCl₃, 100 MHz): 145.7, 130.9, 123.4, 122.6 (q, *J*(C-F) = 285 Hz), 117.4, 113.2, 83.2 (q, *J*(C-F) = 34 Hz), 56.1. ¹⁹F NMR (CDCl₃): -80.03 (d, *J* = 4.6 Hz). **HRMS:** Calc'd for C₉H₁₀BrF₃NO (M+H)⁺: 283.9892; found: 283.9896.

4-bromo-N-(2,2,2-trifluoro-1-methoxyethyl)aniline (1g). Eluent: hexanes / EtOAc 80:20. Yield= 75% (clear oil) ¹H NMR (CDCl₃, 400 MHz): 7.31-7.35 (m, 2H), 6.64-6.68 (m, 2H), 4.91, 4.97 (m, 1H), 4.23-4.29 (br, 1H), 3.47 (s, 1H). ¹³C NMR (CDCl₃, 100 MHz): 143.5, 132.4, 122.7 (q, *J*(C-F) = 285 Hz), 116.2, 112.4, 83.5 (q, *J*(C-F) = 32 Hz), 56.1. ¹⁹F NMR (CDCl₃): -80.00 (d, *J*(C-F) = 4.3 Hz). **HRMS:** Calc'd for C₉H₁₀BrF₃NO (M+H)⁺: 283.9892; found: 283.9896.

N-(2,2,2-trifluoro-1-methoxyethyl)benzo[d][1,3]dioxol-5-amine (1h). Eluent: hexanes/ EtOAc 92:8. Yield= 33% (white solid, mp = 48-50 °C) ¹H NMR (CDCl₃, 400 MHz): 6.69 (d, *J* = 8.3 Hz, 1H), 6.39 (d, *J* = 2.4 Hz, 1H), 6.24 (dd, *J* = 8.2 Hz, 2.4 Hz, 1H), 5.90 (s, 2H), 4.81-4.87 (m, 1H), 4.01-4.06 (br, 1H), 3.48 (s, 3H). ¹³C NMR (CDCl₃, 100 MHz): 148.5, 141.9, 139.6, 122.8 (q, *J*(C-F) = 282 Hz), 108.7, 107.5, 101.0, 98.2, 84.9 (q, *J*(C-F) = 32 Hz), 56.2. ¹⁹F NMR (CDCl₃): -80.01 (d, *J*(C-F) = 4.3 Hz). **HRMS:** Calc'd for C₁₀H₁₁F₃NO₃ (M+H)⁺: 250.0686; found: 250.0675

4-nitro-N-(2,2,2-trifluoro-1-methoxyethyl)aniline. Eluent: hexanes/ EtOAc 80:20. Yield= 77% (yellow solid, mp = 89-91 °C). ¹H NMR (CDCl₃, 400 MHz): 8.14-8.18 (m, 2H); 6.79-6.83 (m, 2H); 5.06-5.11 (m, 1H); 4.86-4.92 (br, 1H); 3.52 (s, 3H). ¹³C NMR (CDCl₃, 100 MHz): 150.0; 140.8; 126.2; 122.4 (q, *J*(C-F) = 283 Hz); 113.2; 82.4 (q, *J*(C-F) = 35 Hz); 56.4. ¹⁹F NMR (CDCl₃): -79.9 (d, *J*(C-F) = 4.6 Hz). **HRMS:** Calc'd for C₉H₁₀F₃N₂O₃ (M+H)⁺: 251.0622; found: 250.0637.

2) **Products.** *Synthesized according to General Procedure B.*

(S)-N-(2,2,2-trifluoro-1-phenylethyl)aniline (2a).^{4, 5} Eluent: hexanes/ EtOAc 97:3. Pale yellow oil. $[\alpha]_D^{20} = +47.0$ ($c=0.55$ CHCl₃). ¹H NMR (CDCl₃, 400 MHz): 7.33-7.48 (m, 5H); 7.13-7.18 (m, 2H); 6.75-6.79 (m, 1H); 6.62-6.65 (m, 2H); 4.87-4.95 (m, 1H); 4.30-4.32 (br, 1H). ¹³C NMR (CDCl₃, 100 MHz): 145.5; 134.1; 129.4; 129.1; 128.9; 127.9; 125.1 (q, $J(\text{C-F}) = 283$ Hz); 119.2; 113.9; 60.6 (q, $J(\text{C-F}) = 31$ Hz). ¹⁹F NMR (CDCl₃): -74.1 (d, $J(\text{C-F}) = 7.9$ Hz). **HPLC:** AD-H column; flow rate= 1mL/ min; eluent: 1% to 5% isopropanol in hexanes (linear gradient over 20 min); $t_R(\text{major})=9.1$ min, $t_R(\text{minor})=11.4$ min.

(S)-4-methoxy-N-(2,2,2-trifluoro-1-phenylethyl)aniline (2b).⁴ Eluent: hexanes/ EtOAc 95:5. Pale yellow oil. $[\alpha]_D^{20} = +81.0$ ($c=0.57$ CHCl₃). ¹H NMR (CDCl₃, 400 MHz): 7.34-7.47 (m, 4H); 6.59-6.63 (m, 2H); 6.71-6.74 (m, 2H); 4.76-4.84 (m, 1H); 4.04-4.11 (br, 1H); 3.70 (s, 3H). ¹³C NMR (CDCl₃, 100 MHz): 153.3; 139.5; 134.3; 129.1; 128.9; 127.9; 125.2 (q, $J(\text{C-F}) = 283$ Hz); 115.7; 114.9; 61.7 (q, $J(\text{C-F}) = 29$ Hz); 55.6. ¹⁹F NMR (CDCl₃): -74.1 (d, $J(\text{C-F}) = 7.6$ Hz). **HPLC:** AD-H column; flow rate= 1mL/ min; eluent: 10% isopropanol in hexanes, $t_R(\text{major})=7.7$ min, $t_R(\text{minor})=10.7$ min.

(S)-N-(2,2,2-trifluoro-1-phenylethyl)benzo[d][1,3]dioxol-5-amine (2c). Eluent: hexanes/ EtOAc 93:7. Off-white solid (mp= 73-75 °C). $[\alpha]_D^{20} = +68.8$ ($c=0.49$ CHCl₃). ¹H NMR (CDCl₃, 400 MHz): 7.34-7.43 (m, 5H); 6.60 (d, $J = 8.0$ Hz, 1H); 6.26 (d, $J = 2.9$ Hz, 1H); 6.06 (dd, $J = 8.3$ Hz, 2.9 Hz, 1H); 5.83 (s, 2H); 4.74-4.81 (m, 1H); 4.10 (br, 1H). ¹³C NMR (CDCl₃, 100 MHz): 148.4; 140.97; 140.95; 134.1; 129.1; 128.9; 127.9; 125.0 (q, $J(\text{C-F}) = 284$ Hz); 108.5; 106.3; 100.8; 97.4; 61.7 (q, $J(\text{C-F}) = 30$ Hz). ¹⁹F NMR (CDCl₃): -74.0 (d, $J(\text{C-F}) = 7.0$ Hz). **HPLC:** AD-H column; flow rate= 1mL/ min; eluent: 10% isopropanol in hexanes, $t_R(\text{major})=7.3$ min, $t_R(\text{minor})=8.8$ min. **HRMS:** Calc'd for C₁₅H₁₃F₃NO₂ (M+H)⁺: 296.0893; found: 296.0893.

(S)-4-bromo-N-(2,2,2-trifluoro-1-phenylethyl)aniline (2d). Eluent: hexanes/ EtOAc 97:3. Clear oil. $[\alpha]_D^{20} = +69.9$ ($c=0.47$ CHCl₃). ¹H NMR (CDCl₃, 400 MHz): 7.38-7.42 (m, 5H); 7.22-7.25 (m, 2H); 6.49-6.53 (m, 2H); 4.82-4.89 (m, 1H); 4.32-4.36 (br, 1H). ¹³C NMR (CDCl₃, 100 MHz): 144.5; 135.5; 132.1; 129.3; 129.0; 127.8; 124.9 (q, $J(\text{C-F}) = 284$ Hz); 115.6; 111.1; 60.6 (q, $J(\text{C-F}) = 30$ Hz). ¹⁹F NMR (CDCl₃): -74.1 (d, $J(\text{C-F}) = 7.6$ Hz). **HPLC:** AD-H column; flow rate= 1mL/ min; eluent: 10% isopropanol in hexanes, $t_R(\text{major})=7.5$ min, $t_R(\text{minor})=10.4$ min. **HRMS:** Calc'd for C₁₄H₁₂BrF₃N (M+H)⁺: 330.0105; found: 330.0098.

(S)-4-chloro-N-(2,2,2-trifluoro-1-phenylethyl)aniline (2e).⁷ Eluent: hexanes/ EtOAc 97:3. Clear oil. $[\alpha]_D^{20} = +63.1$ ($c=0.49$ CHCl₃). ¹H NMR (CDCl₃, 400 MHz): 7.37-7.45 (m, 4H); 7.08-7.12 (m, 2H); 6.54-6.58 (m, 2H); 4.82-4.89 (m, 1H); 4.32-4.35 (br, 1H). ¹³C NMR (CDCl₃, 100 MHz): 144.0; 133.6; 129.3; 129.2; 129.0; 127.9; 124.9 (q, $J(\text{C-F}) = 283$ Hz); 124.0; 115.1; 60.7 (q, $J(\text{C-F}) = 30$ Hz). ¹⁹F NMR (CDCl₃): -74.0 (d, $J(\text{C-F}) = 6.8$ Hz). **HPLC:** AD-H column; flow rate= 1mL/ min; eluent: 15% isopropanol in hexanes, $t_R(\text{major})=6.1$ min, $t_R(\text{minor})=8.1$ min.

(S)-Ethyl 4-((2,2,2-trifluoro-1-phenylethyl)amino)benzoate (2f). Eluent: hexanes/ EtOAc 90:10. Off-white solid (mp=125-128 °C). $[\alpha]_D^{20} = +78.2$ ($c=0.58$ CHCl₃). ¹H NMR (CDCl₃, 400 MHz): 7.84-7.88 (m, 2H); 7.38-7.46 (m, 5H); 6.81-6.84 (m, 2H); 4.96-5.07 (m, 1H); 4.71-4.75 (br, 1H); 4.30 (q, $J = 7.1$ Hz, 2H); 1.34 (t, $J = 7.1$ Hz, 3H). ¹³C NMR (CDCl₃, 100 MHz): 166.4; 149.1; 133.2; 131.4; 129.4; 129.1; 127.8; 124.8 (q, $J(\text{C-F}) = 282$ Hz), 121.0; 112.7; 60.4; 50.9 (q, $J(\text{C-F}) = 30$ Hz), 14.4. ¹⁹F NMR (CDCl₃): -74.0 (d, $J(\text{C-F}) = 7.3$ Hz). **HPLC:** AD-H column; flow rate= 1mL/ min; eluent: 15-22 % isopropanol in hexanes (linear gradient over 20 min), $t_R(\text{major})=9.8$ min, $t_R(\text{minor})=17.2$ min. **HRMS:** Calc'd for C₁₇H₁₇F₃NO₂ (M+H)⁺: 324.1211; found: 324.1216.

(S)-3-bromo-N-(2,2,2-trifluoro-1-phenylethyl)aniline (2g). Eluent: hexanes/ EtOAc 96:4. Pale yellow oil. $[\alpha]_D^{20} = +59.5$ ($c=0.46$ CHCl₃). ¹H NMR (CDCl₃, 400 MHz): 7.39-7.44 (m, 4H); 6.98-7.03 (m, 1H); 6.88-6.91 (m, 1H); 6.80-6.82 (m, 1H); 6.53-6.56 (m, 1H); 4.83-4.92 (m, 1H); 4.34-4.39 (br, 1H). ¹³C NMR (CDCl₃, 100 MHz): 146.8; 133.4; 130.6; 129.3; 129.0; 127.8; 124.8 (q, $J(\text{C-F}) = 283$ Hz); 123.2; 122.1; 116.7; 112.4; 60.3 (q, $J(\text{C-F}) = 30$ Hz). ¹⁹F NMR (CDCl₃): -74.0 (d, $J(\text{C-F}) = 7.0$ Hz). **HPLC:** AD-H column; flow rate= 1mL/ min; eluent: 1% to 5% isopropanol in hexanes (linear gradient over 20 min); $t_R(\text{major})=12.2$ min, $t_R(\text{minor})=14.6$ min. **HRMS:** Calc'd for C₁₄H₁₂BrF₃N (M+H)⁺: 330.0105; found: 330.0099.

(S)-2-methoxy-N-(2,2,2-trifluoro-1-phenylethyl)aniline (2h).⁷ Eluent: hexanes/ EtOAc 97:3. Yellow oil. $[\alpha]_D^{20} = +2.7$ ($c=0.62$ CHCl₃). ¹H NMR (CDCl₃, 400 MHz): 7.23-7.45 (m, 5H); 6.71-6.77 (m, 3H); 6.50-6.52 (m, 1H); 5.03-5.07 (br, 1H); 4.89-4.94 (m, 1H). ¹³C NMR (CDCl₃, 100 MHz): 147.1; 135.4; 134.2; 129.0; 128.8; 128.0; 125.1 (q, $J(\text{C-F}) = 283$ Hz); 121.1; 118.4; 111.1; 109.8; 60.3 (q, $J(\text{C-F}) = 30$ Hz); 55.6. ¹⁹F NMR (CDCl₃): -74.1 (d, $J(\text{C-F}) = 7.6$ Hz). **HPLC:** AD-H column; flow rate= 1mL/ min; eluent: 1-5 % isopropanol in hexanes (linear gradient over 20 min), $t_R(\text{major})=6.4$ min, $t_R(\text{minor})=7.3$ min.

(S)-4-methoxy-N-(2,2,2-trifluoro-1-(p-tolyl)ethyl)aniline (2i).⁶ Eluent: hexanes/ EtOAc 95:5. Clear oil. $[\alpha]_D^{20} = +80.0$ ($c=0.55$ CHCl₃). ¹H NMR (CDCl₃, 400 MHz): 7.29-7.33 (m, 2H); 7.16-7.24 (m, 2H); 6.70-6.76 (m, 2H); 6.56-6.62 (m, 2H); 4.73-4.80 (m, 1H); 4.00-4.08 (br, 1H); 3.70 (s, 3H); 2.3 (s, 3H). ¹³C NMR (CDCl₃, 100 MHz): 153.2; 139.6; 138.9; 131.3; 129.6; 127.8; 125.2 (q, $J(\text{C-F}) = 282$ Hz); 115.7; 114.8; 61.4 (q, $J(\text{C-F}) = 30$ Hz); 56.5; 21.1. ¹⁹F NMR (CDCl₃): -74.2 (d, $J(\text{C-F}) = 7.7$ Hz). **HPLC:** AD-H column; flow rate= 1mL/ min; eluent: 10% isopropanol in hexanes, $t_R(\text{major})=7.8$ min, $t_R(\text{minor})=10.4$ min.

(S)-N-(1-([1,1'-biphenyl]-4-yl)-2,2,2-trifluoroethyl)-4-methoxyaniline (2j). Eluent: hexanes/ EtOAc 92:8. Off-white solid (mp= 106-108 °C). $[\alpha]_D^{20} = +113.4$ (c=0,49 CHCl₃). ¹H NMR (CDCl₃, 400 MHz): 7.30-7.62 (m, 9H); 6.71-6.77 (m, 2H); 6.59-6.65 (m, 2H); 4.80-4.89 (m, 1H); 4.08-4.12 (br, 1H); 3.70 (s, 3H). ¹³C NMR (CDCl₃, 100 MHz): 153.3; 142.0; 140.3; 139.5; 133.2; 128.8; 128.3; 127.61; 127.60; 127.1; 125.2 (q, $J(\text{C-F}) = 283$ Hz); 115.7; 114.9; 61.5 (q, $J(\text{C-F}) = 30$ Hz); 56.6. ¹⁹F NMR (CDCl₃): -74.0 (d, $J(\text{C-F}) = 7.6$ Hz). **HPLC:** AD-H column; flow rate= 1mL/ min; eluent: 10% isopropanol in hexanes, $t_R(\text{major})=12.3$ min, $t_R(\text{minor})=17.0$ min. **HRMS:** Calc'd for C₂₁H₁₉F₃NO (M+H)⁺: 358.1419; found: 324.1419.

(S)-N-(1-(4-(tert-butyl)phenyl)-2,2,2-trifluoroethyl)-4-methoxyaniline (2k). Eluent: hexanes/EtOAc 95:5. Orange oil. $[\alpha]_D^{20} = +83.1$ (c=0,55 CHCl₃). ¹H NMR (CDCl₃, 400 MHz): 7.34-7.40 (m, 5H); 6.74-6.77 (m, 2H); 6.62-6.65 (m, 2H); 4.73-4.81 (m, 1H); 3.99-4.05 (br, 1H); 3.72 (s, 3H); 1.31 (s, 9H). ¹³C NMR (CDCl₃, 100 MHz): 153.2; 152.0; 139.7; 131.2; 127.5; 125.8; 125.3 (q, $J(\text{C-F}) = 282$ Hz); 115.6; 114.8; 61.3 (q, $J(\text{C-F}) = 30$ Hz); 55.6; 34.6; 31.2. ¹⁹F NMR (CDCl₃): -74.1 (d, $J = 7.2$ Hz). **HPLC:** AD-H column; flow rate= 1mL/ min; eluent: 10% isopropanol in hexanes, $t_R(\text{major})=5.8$ min, $t_R(\text{minor})=6.4$ min. **HRMS:** Calc'd for C₁₉H₂₃F₃NO (M+H)⁺: 338.172; found: 338.1731

(S)-4-methoxy-N-(2,2,2-trifluoro-1-(4-methoxyphenyl)ethyl)aniline (2l).⁶ Eluent: hexanes/ EtOAc 93:7. White solid (mp=71-73 °C). $[\alpha]_D^{20} = +77.0$ (c=0,50 CHCl₃). ¹H NMR (CDCl₃, 400 MHz): 7.34-7.37 (m, 2H); 6.88-6.92 (m, 2H); 6.71-6.75 (m, 2H); 6.57-6.61 (m, 2H); 4.72-4.77 (brm, 1H); 3.97-4.04 (br, 1H); 3.79 (s, 3H); 3.71 (s, 3H). ¹³C NMR (CDCl₃, 100 MHz): 160.0; 153.2; 139.6; 129.1; 126.2; 125.2 (q, $J(\text{C-F}) = 283$ Hz); 115.7; 114.8; 114.3; 61.1 (q, $J(\text{C-F}) = 30$ Hz); 55.6; 55.3. ¹⁹F NMR (CDCl₃): -74.4 (d, $J(\text{C-F}) = 7.6$ Hz). **HPLC:** AD-H column; flow rate= 1mL/ min; eluent: 10% isopropanol in hexanes, $t_R(\text{major})=11.7$ min, $t_R(\text{minor})=17.0$ min

(S)-N-(1-(4-(benzyloxy)phenyl)-2,2,2-trifluoroethyl)-4-methoxyaniline (2m). Eluent: hexanes/ EtOAc 92:8. Clear oil. $[\alpha]_D^{20} = +87.7$ ($c=0.67$ CHCl₃). ¹H NMR (CDCl₃, 400 MHz): 7.30-7.47 (m, 7H); 6.95-6.99 (m, 2H); 6.71-6.75 (m, 2H); 6.57-6.61 (m, 2H); 5.04 (s, 2H); 4.69-4.76 (m, 1H); 3.97-4.03 (br, 1H); 3.69 (s, 3H). ¹³C NMR (CDCl₃, 100 MHz): 159.3; 153.2; 139.5; 136.7; 129.1; 128.6; 128.1; 127.5; 126.5; 125.2 (q, $J(\text{C-F}) = 282$ Hz); 115.7; 115.1; 114.8; 70.0; 61.1 (q, $J(\text{C-F}) = 30$ Hz); 55.6. ¹⁹F NMR (CDCl₃): -74.3 (d, $J(\text{C-F}) = 7.3$ Hz). **HPLC:** AD-H column; flow rate= 1mL/ min; eluent: 15% to 22% isopropanol in hexanes (linear gradient over 20 min); $t_R(\text{major})=13.2$ min, $t_R(\text{minor})=19.0$ min. **HRMS:** Calc'd for C₂₂H₂₁F₃NO₂ (M+H)⁺: 338.1518; found: 338.1512.

(S)-4-methoxy-N-(2,2,2-trifluoro-1-(4-fluorophenyl)ethyl)aniline (2n). Eluent: hexanes/EtOAc 95:5. Yellow oil. $[\alpha]_D^{20} = +77.0$ ($c=0.67$ CHCl₃). ¹H NMR (CDCl₃, 400 MHz): 7.41-7.44 (m, 1H); 7.04-7.10 (m, 1H); 6.70-6.76 (m, 1H); 6.54-6.60 (m, 1H); 4.78-4.82 (m, 1H); 4.02-4.06 (br, 1H); 3.71 (s, 3H). ¹³C NMR (CDCl₃, 100 MHz): 163.0 (d, $J(\text{C-F}) = 249$ Hz); 153.4; 139.2; 130.0 (d, $J(\text{C-F}) = 3$ Hz); 129.7 (d, $J(\text{C-F}) = 9$ Hz); 124.9 (q, $J(\text{C-F}) = 282$ Hz); 115.9 (d, $J(\text{C-F}) = 22$ Hz); 115.7; 114.8; 60.1 (q, $J(\text{C-F}) = 30$ Hz); 55.6. ¹⁹F NMR (CDCl₃): -74.3 (d, $J = 7.2$ Hz), 3F); -112.6 (m, 1F). **HPLC:** AD-H column; flow rate= 1mL/ min; eluent: 1-5 % isopropanol in hexanes (linear gradient over 20 min, then hold at 5% IPA), $t_R(\text{major})=16.4$ min, $t_R(\text{minor})=21.1$ min. **HRMS:** Calc'd for C₁₅H₁₄F₄NO (M+H)⁺: 330.1012; found: 330.1014.

(S)-4-methoxy-N-(2,2,2-trifluoro-1-(4-methoxyphenyl)ethyl)aniline (2o).⁶ Eluent: hexanes/ EtOAc 93:7. White solid (mp=71-73 °C). $[\alpha]_D^{20} = +77.0$ ($c=0.50$ CHCl₃). ¹H NMR (CDCl₃, 400 MHz): 7.34-7.37 (m, 2H); 6.88-6.92 (m, 2H); 6.71-6.75 (m, 2H); 6.57-6.61 (m, 2H); 4.72-4.77 (brm, 1H); 3.97-4.04 (br, 1H); 3.79 (s, 3H); 3.71 (s, 3H). ¹³C NMR (CDCl₃, 100 MHz): 160.0; 153.2; 139.6; 129.1; 126.2; 125.2 (q, $J(\text{C-F}) = 283$ Hz); 115.7; 114.8; 114.3; 61.1 (q, $J(\text{C-F}) = 30$ Hz); 55.6; 55.3. ¹⁹F NMR (CDCl₃): -74.4 (d, $J(\text{C-F}) = 7.6$ Hz). **HPLC:** AD-H column; flow rate= 1mL/ min; eluent: 10% isopropanol in hexanes, $t_R(\text{major})=11.7$ min, $t_R(\text{minor})=17.0$ min.

(S)-Ethyl 4-((2,2,2-trifluoro-1-(m-tolyl)ethyl)amino)benzoate (2p). Eluent: hexanes/EtOAc 90:10. Off-white solid (mp = 94-96 °C). $[\alpha]_D^{20} = +59.8$ (c=0.96 CHCl₃). **¹H NMR** (CDCl₃, 400 MHz): 7.85-7.89 (m, 2H); 7.19-7.31 (m, 4H); 6.61-6.66 (m, 2H); 4.92-4.99 (m, 1H); 4.65-4.75 (br, 1H); 4.31 (q, $J = 7.1$ Hz), 2H); 2.37 (s, 3H); 1.34 (t, $J = 7.1$ Hz), 3H). **¹³C NMR** (CDCl₃, 100 MHz): 166.4; 149.3; 138.9; 133.2; 131.4; 130.2; 128.9; 128.4; 124.84; 124.81 (q, $J(\text{C-F}) = 282$ Hz); 120.9; 112.7; 60.4; 59.9 (q, $J(\text{C-F}) = 30$ Hz); 21.4; 14.4. **¹⁹F NMR** (CDCl₃): -73.9 (d, $J = 7.0$ Hz). **HPLC:** AD-H column; flow rate= 1mL/ min; eluent: 15-22 % isopropanol in hexanes (linear gradient over 20 min), $t_R(\text{major})=8.6$ min, $t_R(\text{minor})=11.4$ min. **HRMS:** Calc'd for C₁₈H₁₉F₃NO₂ (M+H)⁺: 338.1362; found: 338.1372.

(S)-2,2,2-trifluoro-1-phenylethan-1-aminium chloride (3).⁶ $[\alpha]_D^{20} = +18.7$ (c=0.57 MeOH). **¹H NMR** (D₂O, 400 MHz): 7.56-7.62 (m, 5H); 5.30 (q $J(\text{C-F}) = 7.2$ Hz, 1H).

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2a

2b

2d

2e

S31

2k

2m

S45

2n

2o

2p

2p

S51

3